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TALKS TO STUDENTS ON THE ART OF STUDY

BY

FRANK CRAMER

AUTHOR OF THE "METHOD OF DARWIN: A STUDY IN SCIENTIFIC METHOD"

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1902

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TO MY FATHER-IN-LAW

ROBERT SAMSON THOMAS

WHOSE OLD AGE IS
CROWNED WITH A RECORD
OF NOBLE LIVING

PREFACE.

Anyone who is rash enough to add one more to the hundred thousand books and pamphlets that have already been written on the general subject of education ought, perhaps, to give a somewhat elaborate justification for his act. This book must make its own defense for existence. If it does not make good the intention of its author it will go promptly to its long home where most of the others already are.

The book is not intended to fill the place of a manual of logic or psychology or pedagogy. There is already a surfeit of such books. It is intended to furnish effective suggestion to the student who is passing through the critical period of his intellectual life, while the mental powers are plastic but on the point of setting. The writer believes that with helpful suggestion, youth can in a measure be its own instructor in the matter of the right training of its powers. The first essential to this end is that it shall see clearly what is wanted.

When the writer was a child, the Indian boys used to come into his native village on pleasant winter days to shoot pennies that idle white men put up on hitching posts for them. Those young Indians nearly always got

the pennies; but not merely because they had good bows and arrows, but because they made such accurate study of their weapons and of distances. When an arrow missed its mark, it became a subject of discussion and explanation. And there is no doubt that every failure was forced to teach a lesson. It was the careful study of the weapons and conditions that made the shooting accurate, and caused even the little lads to become so quickly skillful.

Skill comes quickly only by attention to the method in which the thing is done; and the highest kind of skill in anything is never attained by heedless repetition. I have faith that the student, at least in the later years of the secondary school and the first year in college can understand the necessary explanations of his own mental activity. And when once his attention is fixed upon it, he can see, perhaps better than his teacher, the most glaring defects in his methods of study.

The book has been written entirely from the student's point of view; and therefore no attention whatever has been given to courses of study or modes of presentation, subjects which depend exclusively on the teacher and are discussed in the formal pedagogical treatises. There are doubtless dry places in it. When the reader reaches them he may avoid the desert and tarry not nor stay his feet until he is on the other side. But if curiosity overcomes the repulsion, he may find that even a desert can teach something to a good thinker. If this book does not meet the requirements, someone will yet write one

that will answer the purpose. The only thing I feel very sure about is that there is need of such a book.

Whatever claims may be set up for the contents of the book, there can be no serious claim to originality. Many of the ideas are as old as Aristotle and have been handed on from writer to writer. Nearly everything in it is common property. Help has been drawn from many sources and among those whose work has been drawn upon I need to mention especially Bagehot, Bain, Harris, Herbart, Huxley, William James, Jevons, Kay, Locke, and Spencer. I have to acknowledge especial indebtedness to James' Principles of Psychology and Jevons' Principles of Science. Ordinarily, in a systematic work, direct quotation and references to sources are strictly in order; but the writer has sought to simplify the character of the discussions by avoiding both, and it is hoped that the above acknowledgments will meet fully the requirements of both justice and good taste. The thanks of the author are due to Mr. John C. Kirtland, Jr., of Phillips Academy, Exeter, New Hampshire, Miss Hattie Lummis of Chicago, and President B. P. Raymond of Wesleyan University, Middletown, Connecticut, for many important suggestions.

FRANK CRAMER.

June 20, 1902.

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TALKS TO STUDENTS ON THE ART OF STUDY

CHAPTER I.

THE LAW OF HABIT.

A pendulum made of a marble and a piece of string, if let alone, hangs still and straight. If the marble bob is struck, the pendulum swings to and fro across the point from which it was started by the initial stroke. But even under such compulsion it beats across the vertical in ever diminishing curves. After a period of rhythmic motion, if let alone, it comes to rest, in its old position of stable equilibrium. Force can move it away, but it always comes back to the starting point.

In other cases the opposite is true. As soon as a disturbance is started all of nature's forces conspire to increase the effect and prevent a return to the old condition. Putty is powdered chalk well mixed with linseed oil, and is carefully stored in bladders to keep it from drying out. It is in an unstable condition. It can be used but once. It is kept plastic until it can be applied, but when it is put to use, it undergoes the single fateful change, and its career of usefulness depends upon

the permanence of the change. When soft it is plastic enough to be molded; and when dry it is rigid enough to keep its shape. When a thing is in unstable equilibrium, disturbance starts a change that is never again undone.

A chopper strides through the snow to the foot of a big pine tree, that seems to pierce the sky. It has been so true to the light above, it is so straight, that he can drop it where he will. He must make it fall where it can be most easily reached by the skidding teams. With an easy cunning born of experience he cuts a little lower on one side of the tree than on the other, and chops last on the higher side. The tree is indifferent; it can fall anywhere. But when the work is done there is a dainty quiver of its million needles; it seems to stand with majestic poise—a giant about to die. The chopper puts the last few strokes just where they are needed, and with a crack, a rush, and a crash, the tree falls where he intended it should. Stately in its uprightness, it needed but an inch or two of over-weight on one side; thenceforward it was doomed to move in a single way. The slightest, nicely gauged initial push decided the fate of a giant which a little while before might have been pulled the other way by a child with a silken cord.

An unstable thing is set, as it were, with a hair-trigger attachment, and a relatively slight amount of force applied, lets loose the vastly greater latent force of the thing itself. It may be so nicely balanced that it seems to poise and quiver, as if in search of the true

direction. But after a little, initial, decisive push, the nature of the thing itself transforms this gentle inclination into a hundred-handed force that locks and seals the fate of the thing beyond repair, and it lies at last, with its power expended and its destiny fixed.

A new coat sleeve has no inclinations. It has become adapted to no arm. In the ordinary sense, it may fit a hundred different men; but in the truer, deeper sense, of having become adjusted, it fits no arm whatever. But let the coat be worn. The arm within the sleeve furnishes a constant force that bends and straightens it. Wrinkles begin to show, and become more and more pronounced. The sleeve, at first indifferent in the matter of wrinkles, was capable of being impressed with any set. But once that particular arm begins to live in the sleeve, that particular set of wrinkles is inevitable. Their arrangement is determined by a rigid mechanical law.

The sleeve has taken on a habit. Of numberless possibilities, one has been realized, and at the same time all the others have been excluded. The sleeve has yielded to force, and its structure has been modified. It has a character now. And so with a boot. Neither will ever really fit another arm or foot after it is once "well-broken."

The smooth-skinned face and smooth-pressed coat belong in the same class. Neither appeals to the artist as a subject for study, because neither reveals anything. Character is written in wrinkles. They are the handwriting of force, the record of work done. Character

itself is the final shape taken by material that was once indifferent, plastic, capable of being molded into any form. It is that one of many possibilities which has been realized.

What is true of putty and the pine tree and the boot and the coat sleeve, is true of the human brain and mind. Their destiny, within certain limits, is determined by the forces that are brought to bear upon them. Acts which at first seemed no more easy or inevitable than their opposites, come in time to represent the only possible course of action. Human character is the product of two sets of forces: the constitution or tendencies that are inherited, and the particular habits that are acquired by contact with life's surroundings. Habits may be looked upon as the statute laws of the individual life growing out of the inherited constitution. No one is responsible for the constitutional traits that he has inherited, but within reasonable limits he is personally and solely responsible for the physical, mental, and moral habits that mark out and distinguish his personality from that of other men.

If I could invent a good, strong, new word to supplant the word *habit*, I would do it gladly, in self-defense; because the law of habit is so striking, and so fundamental in the development of every human life, that it has been made the theme of myriads of sermons, lectures and school essays. One who undertakes to say anything about it, is forced to face the revulsion that has been produced by constant harping and endless repe-

tition. But the very reasons that have made it a threadbare subject, make it important that the student should consider it seriously and at the very outset of his intellectual development. The law of habit, which is the very law of our being, is what makes life easy; without it existence would not only be intolerable, but impossible. Its general significance from the student's point of view cannot be over-emphasized; and it may be made one of the most attractive subjects of thought in connection with the general problem of education which the student is trying to solve.

Our lives are almost entirely composed of routine acts—acts indefinitely repeated with the return of the days and nights. But every act that is subject to repetition becomes subject to the law of habit; so that our lives are really made up of performances governed by this inexorable law. That is why we repeat and repeat the trite old saying, Man is a bundle of habits. Now the student is in the act of making such a bundle; and what its nature and value will be, depends on the consideration that he gives to the fundamental law of habit that shall by and by govern him with an iron hand.

In simple words, the law of habit is the tendency to repeat an act of any kind in the same way more easily and with less attention at every successive repetition. However difficult an act or succession of acts may be at first, repetition reduces the difficulty. Ease of performance increases and the amount of attention given to the act grows less and less. When an act has become a habit,

the performance is reduced to its last and mechanical stage. The work is performed without conscious assistance or guidance of the mind. Skill arises from giving attention to the details of the performance until perfection is reached in both accuracy and speed.

Most men trust their lives entirely to the law of habit, without purposeful interference to determine what the particular habits shall be. But the student's power as an intellectual unit will depend on his ability to map out lines of action and train himself to perform these things regularly and accurately under the most helpful law of his being, the law of habit. The amount of action that he can safely trust to habit will determine the amount of mental vigor that he will have left to bestow on things that are new, that come up only once, that are not matters of routine. The law of habit alone makes possible the "economy of mental effort" without which there can be no intellectual progress.

Habit feeds us, guides us over the ground, sees to it that our duties are done, without our giving it, the master of our lives, a single thought. It lightens our labors, it insinuates itself into a mastery over our every act, it dooms us to an easy slavery—a slavery welcome because it relieves us so largely from the necessity of active thought and decision. We are so completely under the control of the law of habit that the mind is left free to fall asleep or busy itself about new and unusual things, and the process by which we slide from strenuous effort in the performance of an act into spontaneous perform-

ance of the same act is so natural, so carefully provided for in the nature of our organism, that it is the one apparently irresistible, inexorable, masterful law of our being.

Most habits are formed along the lines of conduct that gratifies our immediate wants and desires. Our immediate impulses control our acts, and habit makes these acts the faithful attendants of our feelings. All bad habits are formed along the lines of least resistance. They are the ruts where the ungoverned and untrained feelings ran. Habits formed in pursuit of some distant result are almost all good. They are formed deliberately; they are *voluntary* habits. The student, if he expects to govern his career, must do what the scientific experimenter does. He must interfere. The latter, when he makes an experiment, creates his own conditions, decides what arrangements will give him the desired results, and prevents surrounding circumstances from interfering with his plans. If the student makes a study of the law of habit with this end in view, it will be neither dry nor threadbare, but a big and vital subject of perennial interest.

It is not my purpose here to enter upon a discussion of the nature of habit or to trace even in outline the relations between mind and brain. That belongs to psychology and to a later stage of the student's work. I shall at most consider only a few of the practical bearings of the law of habit on the problem of education from the student's own point of view.

Humanity's observations on Habit are not all hopelessly buried in sermons and lectures and essays. They are crystallized into the oldest and commonest proverbs of the race. Now humanity learned most of the truths by which it is guided away from destruction and into success, long before it could give the reasons for them. Men have long been able to judge of a day's weather from the character of the sunrise, without being able to tell why a certain kind of sunrise was a pledge of rainy weather. Such knowledge is empirical; but it serves the practical purpose and is likely to find expression in a short and pithy proverb. So of observations on the law of habit. Men did not know *why* action becomes easy and then inevitable by much repetition; and we do not know overmuch about it now. But they did recognize the facts, and coined such wisdom as the following. "You cannot teach an old dog new tricks"; "as the twig is bent, so the tree will be inclined." "Train up a child in the way he should go: and when he is old, he will not depart from it."

If we had never heard anything about the law of habit, these proverbs would be very striking to us, because they all by precept and figure of speech seek to drive home the same great fact, that with habit as with wheat, there is a seedtime and a harvest. The one truth they tell is that the formation of habits is restricted to youth, and that thereafter forever they lead their helpless, mumbling slave where he does not will to go.

Habit has been called the memory of the spinal cord.

The rational explanation that is given for the law of habit is that the nervous system is the responsible party. The brain and spinal cord are plastic enough to receive impressions and rigid enough to retain them. They are at the outset in an unstable, indifferent condition. They may be impressed with any set of habits; but every physical and mental act leaves an effect on the material of the nervous system. What was once capable of receiving any impression, has now been branded with a particular one. As the little impetus that removed all the possibilities of the falling pine except one, gave the fateful bent, so the first impressions on the nerve material decide what shall become a habit when those materials "set" in their permanent, "stable" form. Brain and cord, like other unstable things, receive the impression, the record, they do the work, during the process of change from the early, unstable to the later, stable condition.

Hence the fact, that has always been so impressive to men, that there is change and progress in the formation of habits only during the early history of the individual. As soon as an act has been once performed, "lines of least resistance" are established. Its repetition is easier because the nervous system is ready now to do that kind of work. After continued repetition of the same kind of act, it is no longer possible to act differently without tremendous effort. Like the putty, the brain and cord have "set" in the forms impressed upon them in their plastic state. The comparative ease of doing, and the

infinite difficulty of undoing, result from this remarkable quality of the human organism.

When once the nervous system has received the early impressions and has assumed some of the burdens of the mind, so that it does easily and without conscious effort of the individual, many things which at first required great effort, the ordinary processes of nutrition keep the nerve tissue in that changed and fixed state. The normal process of renewing the wasted tissue preserves the record, keeps brain and cord in the structure they assumed when first the habits were formed. In course of time all changes cease. The nervous system, and with it the individual habits, become fixed.

CHAPTER II.

HABIT: FRIEND OR ENEMY?

The enormous significance of the power of habit is never fully realized. Habit is, in a sense, the taking of a particular direction. When once it has been entered upon, the human individual is no longer a mere possibility, that may be realized in any one of a thousand different ways. One of the possible ways has been selected, only one result can now be realized; and that result can no more be undone than the yesterdays can be recalled. But none of us is deeply impressed with this fatal truth. We recognize and acknowledge the real power of habit only when it "sports" with us or others. When the mind lets go its supervision, habit leads its subject into ridiculous situations. Then we are startled into a realization that we have a real and merciless master and that we are slaves.

Every reader can recall from his own experience, instances in which inadvertently the mind failed to make connection, at the proper time, with bodily actions that were going on without attention under the strong force of habit; and the ridiculous situations thus created. It is these instances that serve best to show what habit means to the individual life. The writer once knew a

gentleman who had a habit of changing his clothes after caring for his horse. One day he retired to his room, as usual; but he was in a hopeless "brown study." Now the great virtue of habit is that it does its work thoroughly. All that is needed is the initial impulse; the "memory of the spinal cord" will do the rest. He took off his coat, and while he was thinking about something else, habit completed the peeling process and put him to bed in broad daylight.

When once the attention is completely withdrawn, and the mind does not recover the thread of control at the proper moment either because it is preoccupied or because it is incapacitated from doing so, habit follows its purblind course and puts us in a predicament.

In one of the large coast cities of the United States, a policeman, early one morning, found a Swedish sailor clinging to the wing of an angel surmounting the column of a fountain. The sailor's song was rudely interrupted, and later he made an explanation in the police court. He said, "I and another sailor man drank some alcohol. Ay tank I see de ship." The judge appreciated the point and dismissed the case. Habit had caught the intellect in a dazed condition, and on its own responsibility had taken the physical part of the sailor to the top of the monument and had encouraged him to take a reef in the bronze wing of the angel. When habit sports thus with the dignity of our lives, its strength receives a temporary recognition, and we see ourselves as helpless as little children in the clutches of its hundred heavy hands.

Thoreau tells of having seen on a freight train, hides that had been shipped to Boston from the South American pampas. His poetic eyes saw that their tails were still sticking up defiantly as when their owners ran like mad across the grassy plains. He took occasion to remark that if he once knew a man's disposition he would look for no change in it this side the grave.

This view of habit seems to have nothing inspiring in it. Not even the will seems to be taken much into account when once the law of habit has mastered the chief interests of life. But it is well for us that human lives move round in rigid orbits, ruled by the law of habit. If there were no means provided in our organism for making acts more easy to perform with repetition, there could be no skill, no progress. It would be as hard for a man to put on his coat at forty years of age as it was at the age of four or five. Even the rudiments of music would be beyond our reach. We could not dream of, much less carry out, the rapid, complex motions by which music is produced.

The race would perish off the earth without help from the law of habit. There are so many possible ways of doing things, that, if there were no motive of any sort for repeating them in the same way, there could be no continuity of action. And if repetition did not cause the formation of a habit and increase the ease of performance, every act would be and remain a matter of such extreme difficulty that it would be neither pleasant nor profitable.

The force of habit is what makes expectation possible. It produces uniformity of action on the part of each individual, so that others are able to anticipate what he is likely to do. Our friends have been trustworthy, and we believe that they will remain so. If a man lies once, we think he will do it again. These things are true because the law of habit, which underlies our conduct, forever tends to produce uniformity of action. Our judgment of every man is based on the firm conviction that he will always act in the same way. This continued performance of acts in a uniform way gives him an individual character. It marks him out and distinguishes him for all observers.

National character, too, that remarkable thing that seems so striking to the young student of history, is merely a bundle of universal habits. A well-established nation has its own peculiar views of life, and ways of eating, drinking, working and amusing itself. These practices have arisen slowly, and by imitation have come to characterize every individual. And people of different ages reflect the effects of national habit as clearly as an individual reveals at different times of his life, the increasing power of habit over his doings.

Children, transported from their native land, adopt by imitation the national habits of their adopted country. Ancestral habit has only a minor effect on them. They may, on growing up, still harbor a desire to return to the land of their nativity. But the all-pervading law of habit has unfitted them for residence there. They fail

to feel at home where there are habits unlike their own.

A mature man retains for life the habits of his native land and early childhood. He remains a stranger to many things in his adopted country, because the old national habits cling to him; he can no longer adjust himself to the new ones. In America, where there are so many foreigners, it is extremely interesting to the student of the law of habit, to compare those who came from Europe as adults, with their descendants of the first and second generations. The former retain the ancestral habits; and the latter have discarded them, they are a new type, because they have new habits; and they have new habits because they were subjected to the new conditions during life's plastic period.

The law of habit is what makes accumulation of power possible. It preserves what has been gained and sets the mental and physical forces free to work on a higher plane. If an act did not become easier with repetition, the results of that act would be lost as soon as it was performed. The best product of a boy's first effort to make a bow and arrow is not that bow and arrow, but the permanent effect it has on his powers. His first bow and arrow are very poor products, perhaps so poor that they are practically useless. But he is a better mechanic. His judgment in the selection of wood and his skill in cutting are better, and these remain with him, while the bow and arrow may go into the fire. His next performance is based upon this new skill; and it in turn contributes toward his permanent power. While the law of

habit dooms us to live out our lives along the lines in which they are cast in youth, this same law makes our action along those lines constantly more effective through the accumulation of power. Our knowledge, like our physical acts, becomes mechanical. If the law of habit did not take charge of the multiplication table and reduce our knowledge of it to the "mechanical stage," we could never make progress in numbers.

So both action and knowledge are committed to the keeping of the law of habit, with the result that the conscious powers of the mind are left permanently free to deal with new questions. The mind can use all that has been gained, without the necessity of reproducing it painfully when it is wanted again. On the old foundation of action and knowledge that have become mechanical, on the modified nervous structure, rest our skill and the possibility of progress. Over these dead but solid acquisitions, the powers of the mind rise to higher thought and action.

The student's attitude toward this all-powerful law of habit needs to be clearly conceived and carefully attended to. It is his most powerful friend only while he remains master of the situation. While it preserves what has been gained and enables the mind to work on ever higher levels, it may put the mind to sleep entirely. The action of intellect and will are only spasmodic in the average man, because he has become a creature of habit. A new kind of act or a new idea startles him, and he repels it. He no longer has a *growing point.* The student,

while he accumulates, under the law of habit, a strong and heavy body of wood in the trunk of knowledge, must keep the terminal bud of intellectual action alive and healthy and directed upward. The one thing that he has most of all to dread is that this bud will wither. When it is dead, the intellectual tree may long remain green, but growth is over with.

The history of both men and nations reveals the steadying effect of habit, and also its deadening effect. Very few people are convinced or converted by argument. Most men believe what has been believed and do as their fathers did. Those periods are rare in the history of humanity, when some great idea has worked its way into the minds of men and overthrown the views of the past. But even when such a change has come, it is never thoroughly done by argument upon adults who were trained in the older views. The change is completely worked out only in the younger generation, which adopts the new views while mind and body are fresh. The older views shrivel and die, mostly because those who held them pass off the stage of power. One of the most striking instances of this truth is the history of the principles that Darwin promulgated. Some of his strongest supporters, and he himself, felt that his views must make progress, not so much by remodelling the opinions of older men, as by capturing the young mind of the world. And it was so. Not by argument, but by training, is the world slowly moving from its old to its new moorings; and there it is held again by the conservative force of habit.

A bookful of illustrations might be written to show that the adoption of one way of thinking, one line of action, one direction of growth, tends to shut out the possibility of development in any other direction. There can be but little hope of radical change after the individuality is once fixed. A habit and its results, either in a person or a nation, do not fall, like the walls of Jericho, at the blast of trumpets. The will may in most matters be normally strong, but habit, by its very nature, tends to destroy the authority of will. A change of habit requires not only a change of mind, but of body as well. It calls for a complete re-organization of the nervous matter of the brain and spinal cord.

When once wrinkles are formed in a coat sleeve it will always yield along the lines of the old grooves and ridges, even though a new arm be thrust into it. It is no longer a question of forming a set of wrinkles; they are there and must be ousted. A new arm in the sleeve may force modification, but it cannot drive out of existence the old lines of weakness.

Sometimes the pettiest examples illustrate well the supreme difficulty of change in either knowledge or a course of action or of growth. One of my students, in learning the names of the German alphabet, got the pronunciation of four or five of them wrong. He wanted to correct the mistakes from the outset, but no amount of criticism had any apparent effect. Finally he set himself to work with tremendous energy and succeeded. But it cost him at least four or five times as much energy to undo

those few errors as it had originally cost him to learn the whole alphabet.

This principle has a well nigh universal application. Linnaeus made great contributions to both knowledge and method in the field of science; and his doctrines carried great authority with them. His classification of plants was fully adopted in England and Germany, but not so enthusiastically in France. Where then would the natural classification, which ran counter to the Linnaean classification, be most likely to be worked out and most surely take root? In France. England and Germany were very much slower in accepting the natural classification because it conflicted with beliefs and modes of thought already current. Wherever a belief or a mode of thought has once been fully adopted, a new one is always most vigorously resisted. As Bagehot said: "The greatest pain of the human race is the pain of a new idea."

The geological history of the pig tribe furnishes examples of the same principle, that when once modification has started in some particular direction, it is practically impossible to wheel about, undo the results and start again along other lines. At many points in the history of the pig tribe, ambitious off-shoots underwent special modifications and became adapted to special conditions and kinds of life. Some of these were swifter and more graceful than the typical pig, but when the conditions changed in their surroundings, they could no longer adapt themselves to a new environment, and they perished from the face of the earth. They could make progress only *in*

the direction in which they had started. The typical pig, with its general powers unmodified, with its ability to live on anything anywhere, under any conditions, has survived, with piggish obstinacy, all its more ambitious relatives.

Plants, as well as animals, reveal this principle. The Venus' Fly-Trap, that peculiar, highly-modified, insect-catching plant, is a wonderful creation, with astonishing adaptations for catching insects. But it is the only species in its genus, is confined to a small area in North Carolina, and is surely doomed to perish from the earth. Its sister genus of the sundews, which manage to catch insects by much simpler means, are not highly modified, and are much like common plants, contains three hundred different species and they are found in all parts of the world.

A high degree of adaptation to one kind of life shuts out the possibility of adaptation to any other kind. In the conduct of men, long indulgence in error makes a right life thereafter a practical impossibility. The brand has been burned into the very tissues. The being has been changed. When once the mind has been filled with unsound knowledge and has been trained in wrong methods of thought, it is almost impossible to remodel that knowledge and those ways of thinking in the interests of truth.

No human being can busy himself about any kind of thing without forming habits of action and thought. The law is irresistible. When this force has reached its maximum there is nothing left to do, for the vast major-

ity of men, but to follow the lines already laid down and make the best of it, unless along with all the other habits has grown strong and tall the habit of self-mastery. If the life has been one of mental and moral error, it is not very likely to turn into the paths of truth and righteousness. The most it can do is to stand by the wayside and beckon "unmodified" youth into the right path. For rare is the spirit that can make the colossal struggle for release from these laws of physical, mental and moral change. The changes must come. Habits of thought and action will be formed. It is the business of the student to see to it that he sets himself in the right direction, that his habits of study, of thought, of conduct, his views of life, are started right. Thenceforth the law of habit is his strongest and truest friend. It makes sure for him everything that he has struggled for.

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He must see to it that his powers are trained to respond to his best desires. The mind that wills to do one thing, in a body trained to do another, is a house divided against itself. No man ever realizes his ideals; and perhaps it is better that his life should not be all planned in advance, but should be a perpetual re-adjustment to new and unforeseen conditions. But success, in any situation into which a man may be thrown by circumstances, can never come to one with a divided house. A competent mind with a brain and body trained to "come to heel," cannot be a failure anywhere. A mind and body, well trained under the powerful law of habit, makes a pure and vigorous and successful life normal and easy.

When the will and the impulses and the force of habit are agreed for evil, the combination makes a successful villain; when they are agreed for good, no combination of circumstances can make a man a failure. But when the house is divided against itself, the product is no man at all—only a thing of disgust.

What has been said about the law of habit, and the irresistible force of habit has been said primarily for the purpose of applying it to the question of education from the student's own point of view. Success depends on the careful co-operation of all the powers in pursuit of one clearly defined object. There must be no irreconcilable elements in the character—will to do one thing with habits trained to do another. From this point of view education becomes the development of certain habits. Every chapter in this book, with a little remodelling, could be made a subhead under the general subject of habit.

CHAPTER III.

INTEREST.

Half a dozen people may be speaking at once close to a listener, but he listens only to a single voice. He remains oblivious to the others because his attention, guided by his interest, is concentrated on that one. Our mental capacity, our physical powers, are monopolized by that which, for some reason or other, is attractive to us. The attraction may be very strong, appealing powerfully to the feelings; or it may be a remote attraction, appealing only to the intellect. It is not my purpose to enter into an analysis of the nature of interest; but only to point out some of its practical bearings on the work of the student.

Shall a student pursue only those things that spontaneously interest him? If he must develop interest in some things for which he has no inherent liking, what kind of interest shall it be? Shall the burden of exciting the student's interest in his work be laid on the teacher's shoulders, or shall the student hold himself responsible for the cultivation of genuine interest in all the phases of his work?

The gravest problem that teachers have to deal with is that of awakening and sustaining the interest of the

student in his studies. There is less hopeless incapacity among scholars than many people think. The high-schools lose more students after the first year or two because the latter have lost their interest in the work than because of incapacity or the grinding necessity of working for a living. Without interest in a thing the intellect will not work upon it; interest is the fuel to the engine. From the teacher's point of view the student himself is the responsible party; without interest on his part there can be no such thing as education.

The reason why it is so hard to teach a young child is because its attention cannot be riveted. It has no interests that last for more than a minute or two. It has no thought for its own future hunger; for its clothes or its nurture. There is nothing yet permanently fixed in its mind, around which its thought and its action revolve. It is interested only in what is immediately before it; now a rag-doll and then a butterfly; now a flower and then a kitten. It does not know how to postpone a present pleasure for a future pleasure or profit. It has no organized interests; there is no steady purpose running through its life. Its interest and attention are of the wandering, impulsive type that flits from object to object as each strikes its fancy.

As it is with the child, so it is largely with the savage. The future, even the immediate future, is a dim and far away thing that has little or no bearing on present conduct. Now in what important intellectual respect does the highest type of civilization differ from the men-

tal attitude of the savage and the child? It may be said that the fundamental quality in the complex conception that we call civilization is the quality of foresight, providence, exercising thought and energy in the present, for some future good. To the civilized man the future is a definite thing, to be taken carefully into account both for himself and his family. Civilization makes it possible to look steadily into the future and provide for it. There is no grave daily danger that our present efforts to secure some future good will come to naught. The conditions of life are so well established that we are confident we shall be allowed to reap what we have sown. It is this condition of more or less certainty concerning the future that makes us willing to sacrifice present pleasures for more lasting ones that will come only in the future.

But there arises, hourly, in every mind, the question: "Shall I yield to my present impulse, gratify my present interest, or sacrifice these and bend my energies to secure some better, future good?" The student especially is called upon to face squarely this issue; because the very nature of his calling makes it necessary to decide whether he shall serve his present desires and interests, or make present sacrifices in the service of the more remote and permanent interests of his life. The very fact that he is educating himself would indicate that he is going through the process of getting ready for something, that all his present labors are intended to yield their results many years hence. He is supposed to be sacrificing time

and money and energy now for a later reward. This principle needs to be enforced in the details of a student's work as well as in the larger outlines of his general purpose. The problem perpetually recurs: "Is it worth while, in this particular case, to sacrifice present pleasure and comfort to the more remote good?"

It is much easier to preach the doctrine of the sacrifice of present interests in favor of the remote and permanent interests than it is to persuade men of its value as a universal principle of action. In recent years there has been much discussion of the question of good roads in the country. Now good roads were at least as important twenty years before the discussion began as they are now. But it was the advent of the bicycle that made the question a vital one. Bad roads and bicycles do not harmonize. When a man has to pedal his own wheel he makes a vigorous disturbance to get a good road. He wants his labor reduced to a minimum. If a farmer had to pull his own wagon it would be to him an invincible argument in favor of good roads; because good roads would mean the removal of his physical distress. An immediate, present interest in favor of good roads would be developed at once.

But the problem, as it presents itself to the general population, takes the form of alternatives. The farmer merely wants to get to town and back. It is easier for him to struggle over a bad road, carry a smaller load, worry his horses, lose time and vex his temper, than to stop and improve the road before driving over it. It is

cheaper, easier and more to his present interest, to leave the road as it is. To improve the road would mean a large present sacrifice for a series of comparatively small benefits distributed over a long future. In the short run it is better to leave things as they are; but in the long run the farmer's horses and wagons would look better, accomplish more and last longer, and he would be richer and happier and would keep in closer touch with civilization if he would make the present sacrifice for the future good; if he would let his remote interests determine his line of action. The important point about all this is that the big sacrifice will occur but once, and the benefits will be constant and will affect every phase of his life and business.

It is said that in Africa there are well-beaten trails that run as straight as the flight of a crow for hundreds of miles through the great forests. But there is hardly a rod of such a trail that does not have a little bend in it. It turns first to the right and then to the left, as if a flying crow had carried a swinging pendulum to mark the course of the trail. Even savages know how to travel a straight course for a hundred miles, but they cannot keep the little curves and zigzags out of the trail. It is easier for each individual, on every occasion when he comes to a rock or a stump or fallen tree, to go around it than to remove it. In the long run it would be profitable to remove the obstacles by combined effort of the travellers, and straighten the trail. But on each separate occasion that the obstacle "arises," it is not worth while.

And that is why a trail that runs straight across the country has in it those thousands of little time-killing, back-breaking crooks. It requires leadership and a strong impression of permanent benefits to make the present sacrifice.

There are other problems of this nature in which whole nations are interested. It is a serious thing to decide whether a whole people shall make a large sacrifice of present, immediate interests to secure some distant permanent good. The English-speaking races use a language whose spelling is antiquated and ridiculous. It takes an English-speaking child at least a year longer to learn to read its mother tongue than it does a German child; because each sound is represented by several different letters or combinations of letters (as in *beau, though, doe, no, bow*), and often the same letter stands for several different sounds. Our written language is an "asinine feast of sow-thistles" set before our children in their tenderest years.

Historically this crude and curious spelling is interesting and has a vast significance; but practically it is a millstone about the necks of our little ones. This condition of things is so evidently in violation of the so-called practical sense of the Anglo-Saxon race, and such a serious crime against the intellectual possibilities of that race, that a theorist might suppose the old condition of things would not be allowed to continue for a single year.

But it is altogether a question of the relative

strength of the immediate interests of ourselves and the remote interests of our children. If the changes that need to be made to simplify our written language were only slight, or if large, would cause no serious, even temporary inconvenience to anyone, the change would be made over night. And we would congratulate ourselves on our generous foresight for the good of those that are yet to come. But the present loss of time and money and the amount of energy required to re-adjust ourselves to any new spelling would be very great; and the change cannot be made, even though the present sacrifice would be but a driblet compared with the great gain to the coming generations. The remote interests suffer utter collapse because the conflicting present interests are powerful.

Now education, in its very nature, is a serious, long-drawn-out attempt to sacrifice present convenience and success at the altar of the remote and permanent interests of human life. It is a deliberate attempt to build a good road for future use. And the student who is the one primarily interested in this business, has to weigh the matter and make his decision in the face of obstacles.

CHAPTER IV.

SIMPLE AND COMPOUND INTEREST.

In the end, all lines of action become a question of *forming a habit.* As was said in the last chapter, the very nature of a student's calling is the best evidence that in his case there is to be a determined sacrifice of present interests for the purpose of securing the permanent benefits that can be reaped only in later years. But every human being, even a student, tends to lapse into the haphazard, hand-to-mouth mode of life in which remote interests play at best a subordinate and only subconscious part. The vital question with the student is: shall he habitually act upon impulse, giving thought to and securing only immediate pleasant results, or shall he act habitually by voluntary effort, with a view to making his present acts yield the largest possible rewards in the more distant future?

Since everyone, no matter what his calling, meets things in which he takes no interest, which are not attractive to him, which may even be distasteful, the student must frequently face and answer the question whether he will pursue only those things that please him now, or whether he will exercise his pugnacity on difficult and distasteful things, and forever dispose of them by doing

them, in the accomplishment of his more permanent purposes. In recent years the courses of study in school and college have been so enlarged that each student is supposed to be able to choose only those things that he can take some interest in, that have an inherent attraction for him. He can now more easily and thoroughly prepare himself for the calling he has chosen, because he is not obliged to groan and labor over things that only repel him. But while the modern plan of elective studies has given a larger and stronger interest to the work of each individual, the fundamental question remains the same. Will he dodge or will he fight? There is always and everywhere in life a residue of uninteresting matters that have to be considered and done, if any kind of definite purpose is to be realized.

If one is merely indifferent to a line of work, a strong conviction that it ought to be done for the sake of more remote and permanent interests, may lead one to do it with a fair degree of mental and physical comfort. But things that are repugnant at the outset call for something more than an ordinary act of will. When no other feeling will impel to action, it is well to have in reserve the feeling of *anger* and to let it blaze out at the thought that there is anything in the way of success. If one has no interest in doing a difficult or repugnant but necessary thing, one can still interest himself by crushing it because it is a difficulty, because it challenges the fighting qualities.

I know of no other spirit in which to face that in-

evitable residue of unpleasant work that every student meets. "Failure" may as well be branded at the outset on the forehead of him who will do only the work that is pleasant to him at the moment he decides to do it. He is still the victim of his own impulses, and cannot subdue his intellect and will to the service of a steady and useful purpose. He may be a genius, but he is not a man.

But while one's fighting qualities need to be appealed to at many points in a career of study, and one needs to keep steadily in mind the great remote end of all the work while doing what is now uninteresting, interest in the distasteful thing itself begins to grow as the work progresses. The doctrine of compound interest applies to the student's work as well as to the capitalist's money. Herbert Spencer wrote many pages of philosophy to show how rapidly effects of every kind are multiplied if the force at work is only constant. For purposes of calculation, the rate of increase at compound interest is permanently printed in tabular form. Jesus Christ put the doctrine into a sentence: "Whosoever hath, to him shall be given; and whosoever hath not, from him shall be taken even that which he thinketh that he hath."

While it is necessary to do many present things by sheer force of will, if the permanent interests of life are to be faithfully served, no man or woman of spirit needs to feel that such labor must remain uninteresting while it lasts or leave an unpleasant after-taste in memory. As has been said, we are necessarily heedless of most things that happen around us; but in the mind that is quick and

not dead, alert and not asleep, interest will rise from work that is apparently most uninteresting; and when once that new, immediate interest is born, it is not likely to die.

A friend of the writer had to support himself while preparing for entrance into college. This bread and butter interest was very immediate, pressing and constant. It sharpened amazingly his capacity for seeing work that needed to be done. One day he saw a dilapidated fence and offered to repair it for the owner. The latter did not want his fence patched. He wanted a new one. "Can you build me a new fence?" "Yes, sir." And the agreement was made. With the young man it was a case of pure self-assurance that had been cultivated in the hard school of strenuous endeavor. Before that time he had no interest in fences. Why should he work at things that did not interest him? Fences had never meant anything to him except that they were things to climb over or crawl through or tear trousers on.

As long as he had to work anyhow, he might have hunted longer, until he found a job that was easy. If he had had a mind to follow the "lines of least resistance," he would have avoided the fence. But he was not built that way. His mental action was clear. He wanted an education; to get that he wanted money; to get that he wanted work. He would have had no interest in fence-building, if the more remote interest of an education had not stimulated him. But he had the capacity for developing a quick and immediate interest

even in a fence. From that moment every fence taught him a lesson. Distances between posts, the number of nails used, the depth of post-holes, all had a lively interest for him. Board fence, picket fence, iron fence, rail fence each taught him something. Before he knew it he was a connoisseur of fences.

He built a good fence and fairly earned his money. But he did something far more important than either. He had developed a new interest and a new habit—of studying fences. He could no more let a fence alone than a dog can let a cat alone. Later he became state entomologist for one of our most prosperous states. I do not think his knowledge of fences secured him his position; but it was the power of *creating* a new, immediate interest in a piece of work undertaken for the sake of his more permanent desires, and the power of transforming that temporary interest into a new permanent interest that has made him so successful in life.

Students by the thousands choose to prepare themselves for special callings, but are unwilling to sacrifice their feelings in making the necessary preparation. Would-be doctors dislike chemistry and physiology, and study as little of them as possible, and do that little in just as poor a fashion as the law allows. Would-be mechanical, civil, and electrical engineers dislike algebra, and beg to be excused from it. Would-be lawyers often feel a strong distaste for history; and instead of exercising their manhood in a little matter of conquest, they seek to belittle the importance of the task that lies be-

fore them and avoid it if they can. One must have some sort of interest, either temporary or permanent, or he will not act at all. Every student is bound to meet, sooner or later, tasks that have no immediate interest for him; and there is no choice but to master them as they come. After a while the spirit of habitual mastery is developed, and nothing seems too hard or too repulsive. If a student lacks interest in a task he can substitute pugnacity for it until an interest is developed; and that is bound to follow at the heels of the first success.

The difficulty that the student has to deal with is, that with all of us, the present life is much more vivid and real than what is yet far away. Our present desires, pleasures, comfort, ease, are much more substantial in our eyes than any distant good that can come from present effort. A present sacrifice is easily made by resolution; but it is another matter to enforce it. So in the execution of a fixed purpose to have an education for future use, our present interests, our momentary impulses, are always interfering with the steady progress towards the fulfilment of the distant end. But no man ever made a path that was worth anything who kept his eyes fixed on his feet or let them wander at random from object to object of present interest.

A hundred men might tramp over a plowed field and still fail to make a path. But, if one of them, before he started, *knew where he was going* and kept his eye fixed on the distant object, he would stumble sturdily over the clods instead of dodging them and disregard the

dead-furrows instead of trying to follow them for comfort's sake. His track would be only one in a hundred. There would still be no path. But his track, though no deeper than any other, would show such striking characteristics that an observer could distinguish it at once. The strides would be uniform, there would be plain an utter disregard of both local difficulties and temptations, and the track would be *straight.* If that man were to make another trip, in the same state of mind, all the tramping of the ninety-nine would be in vain and disappear. His track would be the trail, and they all, like sheep, would follow. The way-faring man, though a fool, would not err therein; and maybe in his lucid moments he could understand the reason why the trail ran where it did. After the trail was made, he, too, might accidentally become aware of the object on which the first man's eye had been fixed.

And so of intellectual results. If the distant, permanent interests are always kept in view, the local and present interests are easily and steadily subordinated. Not only will the performance be easier, but the very first results will show the striking characteristics that all labor shows which is intended, not to gratify the impulses of the moment, but to serve the ends of a lifetime. Work done in that spirit with such a motive, is work whose results are useful afterwards. This, to my mind, is the reason why every stroke of a student's work should be done with the ultimate end of his labors in view. That is the distinguishing characteristic of all

work of any worth that has ever been done in the world; it is the hallmark of every permanent product of the human mind that is valued as a heritage by thinking men.

Work thus done once is ready for habit to fix permanently in the intellectual structure. Knowledge thus gained is clear and purposeful, and its impression is deeper than that made in random trails of thought. It is easier to do the second time, and one is more likely to do it again. Intellectual work done under those conditions has "the right of way." If the main purpose of the student's life is kept permanently in view, he learns more, learns it better and more rapidly than if he is constantly consulting his temporary comfort and convenience.

Work done in this spirit is the only good material for habit to seize upon. If, as in the making of the trail, the student promptly repeats his work, either by reviewing it or putting it to immediate and regular use, it is secure against all the so-called faults of memory.

To my thinking, two main results are produced by education, both of which depend on how the interest of the individual is centered, and both of which may be expressed in terms of habit. One great outcome of a good education is the ability to do a thing correctly and skillfully at the first effort. This is the great good after which students consciously or unconsciously strive. And if with the development of this power has grown a boundless love of truth, the student has entered within the

sacred gate of a successful intellectual life. But this ability is the fruit of long and silent and often painful practice. It is the habit of doing intellectual work with the final purpose always in view.

An immortal example of the lasting quality of the habit of doing things thoroughly, once for all, is the intellectual life of Charles Darwin. When, as a young man, he made the famous four years' voyage in Her Majesty's Ship Beagle, he had, at each stopping place, only one opportunity to make scientific observations. If he should leave any of his work inaccurate and incomplete, it must remain so forever; for he had no time to return in order to make additions and corrections, a proceeding that is chronic with most students. So all his great powers were bent to the service of his permanent interests. He made strenuous and constant effort to secure fullness and accuracy of observation in order that the reasoning afterwards based on the results might not be defective or false. This trait of his mental action remained a habit throughout life. It stood him in good stead in the long and laborious years of his later scientific career. *He never had to do a thing twice.*

A second permanent result secured to the good student is a large body of valuable knowledge; valuable because it is accurate and can be depended upon, easily accessible because it has become subject to the law of habit. It is so fixed, that when one item recurs to the mind, the rest comes trooping back with no apparent effort of thought to recall it. It has become mechanical.

Not only the alphabet, the multiplication table, the declensions and conjugations of foreign languages, but every group of facts that belong together can, by practice, be subjected to the law of habit and made secure against the so-called whims of memory.

The science of war is compressed into books; but the art of war is a matter of nerve-training. The regulars fight the first battles and hold disaster by the throat until the volunteers are *ready*. The difference between them is that with the regulars obedience, endurance and courage have become habits. In every emergency they can do the right thing at once. They not only know what the volunteers know—but they have developed a permanent state of mind in regard to that knowledge. So with the scholar. The will is re-enforced by a great body of accurate knowledge made familiar by constant practice.

CHAPTER V.

ATTENTION.

Attention is the concentration of the mental powers upon a single object.. All normal human beings are capable of exercising it. The student's interest in the subject therefore relates not so much to the mere existence of the power as to the way in which it is applied. The surest test of a highly trained mind is the power of perfect and steady concentration of the attention upon a single line of thought. The importance of this power the student cannot over-estimate.

Now a little child's life is filled with attentiveness. But it is not the kind that leads to any kind of accomplishment. A beautiful butterfly attracts it so strongly that it forgets all the rest of the world. Its toys and its mother's admonition not to wade in the wet grass are forgotten in the perfect concentration of its attention. But a beautiful flower takes its turn at beckoning to the mental powers of the child. Then the flower is dropped for something else that is new. The senses are busy, but there is no reflection. The attention is not driven to anything by the force of the will. The attraction is from the outside, and the response to it is always immediate because there is no internal thought to control it.

The trouble with a child's attention is that all the possibilities of each new object are at once exhausted. There is nothing new about it any more.

Monotony kills attention; and the child has no new interest in the thing. Its color, its form, its motion are soon observed and then there is nothing left. Nothing but thinking, behind the working of the five senses, can bring out new views of the old thing; but that is just what the young child does not do. It has no permanent interest in butterflies or roses, no permanent interests of any sort. And attention cannot be steadily held on anything, even by the most strenuous act of the will, without a motive for such concentration.

Culture begins with the fixing of the attention upon a few definite things by direct and persistent effort of the will. And it will be worth while to consider a little the conditions under which alone this power can be cultivated.

Inability to concentrate the attention and keep it fixed is the most striking and fateful mark of a weak or untrained mind. But there are certain conditions under which the most highly trained mind cannot keep the attention riveted. Everyone has felt the difficulty of keeping the thought and imagination fixed on a single object for which search is being made in a uniform mass of grass or sand. Extreme weariness soon kills even the desire to find the thing. The mind persists in letting go and wandering; and it requires tremendous will power to make the search a steady and prolonged one. The object

is repeatedly overlooked, simply because the image of it cannot be kept clear, and the mind is not at work upon it. There is no food for thought. Even though other things do not tend to distract the mind by their attractiveness, still it cannot fix and hold the attention on anything that does not stimulate reflection. Attention cannot be permanently fixed upon anything without an accompanying train of thought.

But trains of thought run only where there are tracks. The reason why the child's thought does not take any definite direction and keep it, is because there are no permanent interests in its mind sufficiently well established to furnish a track for thought to run upon. It is only when, by active thinking, the subject that the mind is now attending to, can be made a part of some greater subject, can be connected with some larger and more permanent interest, that attention can be riveted upon it. And the length of time during which interest can be kept riveted upon a subject, or the number of times it can be brought back to it, will usually depend upon the number of ways in which it can be connected with other things, that are already known or have been already thought about.

The monotonous thump of an Indian drum, as it booms across the moon-lit lake from the pines where the bucks are dancing, to the tent where the listener lies awake, may attract his attention for only an instant and then be neglected as nothing but a dull and stupid sound. But if other things are called up by it, if it has *meaning*

for him, it may be weird and beautiful music and awaken wonderful trains of thought and feeling. The mind will muse on prehistoric man and on the fate of the race; wonder whether civilization makes men happier; and ever and ever come back to catch anew the heavy, musical beat, and then to follow away some other new thought into the future or the past. As long as the sound awakens thought, it will make the imagination dance its beautiful maze across the hard, resounding floor of reason. But when it ceases to do this, it will no longer be attended to.

There is only one alternative. When once the sound has ceased to waken thought, attention may for a time be riveted on it by sheer force of will. By the shutting out all other objects of thought that are attractive, that dull, monotonous sound is given full control, and puts both the mind and the man to sleep. The surest way to cultivate an attitude of non-attention—of waking sleep or actual sleep—is to exclude from the mind all objects upon which the imagination can play, and keep the attention fixed by force of will upon something that will not grow, that does not waken the thought. Utter exhaustion, entire withdrawal of the mind—sleep—intervenes.

Whether the beautiful Minnehaha falls shall rivet the attention for only a few minutes or for hours, depends on whether the mind sees something new in it or connected with it, with every passing moment. Attention dies of thirst in the mental desert of monotony. Whether

the glint and flash and music of the water shall hold the mind fixed upon the beauty of the falls depends on whether their charms are kept new and the feelings are kept fresh. The water may still be there and its music be just as loud, but they will be seen and heard only while they are suggestive. As soon as they cease to suggest new associations the subject will be dropped. The continuous sight and sound of Minnehaha, if other subjects of thought are excluded, will dull the faculties and bring on drowsiness.

The mind may be startled into new activity by merely stopping the ears. The sight without the sound wakens an entirely new train of thought. The light and limpid silence, the beauty without the music, touches and wakens hitherto unknown phases of feeling. So, too, when the eyes are shut, the sound alone is different from what it is when coupled with the sight. It conjures up old thoughts and wakens new ones by linking itself with other, long-forgotten sounds.

The scientific side of the subject seems a more sombre topic of attention; but it is even more fruitful in its effects. Why is it a falls, and not a rapids? Why could we walk under and behind the falls and look out through the watery veil? Simple problem with a simple solution, if only the mind has grappling hooks with which to fasten the attention.

The solid rock above, the softer rock beneath, the rythmic flashes and the musical roar of the falling water, the cool, damp shade, the spirit of Minnehaha, bride of

Hiawatha, images of swollen waters in the springtime and frozen wonders in the winter, and last of all perhaps the thought that the beautiful falls is dying for want of a steady water-supply, all hold the attention fixed. It needs no coercion while the topic grows into manifold trains of thought. The will seems indeed to be itself coerced to let the mind attend to the expanding thought. The little falls may thus grow and change and fasten itself to a thousand memories of other times till it has become a permanent part of the intellectual life. The memory of it remains rich and fruitful, for whenever it comes back to mind on the wings of the imagination, it brings with it the deepest thoughts and purest feelings of the human soul.

From the student's point of view the effect of the will upon attention needs to be kept constantly in view. If a subject is not sufficiently interesting to hold the attention, if it does not awaken thought and so make itself attractive, the will must be exercised. For it is the student's chief business to so train the attention that it can be steadily fixed. If he recognizes clearly the fact that, in order to make attention steady and persistent, the subject attended to must waken thought, his duty lies plain before him. For a short time attention can be fixed on an uninteresting thing by force, but hardly for more than an instant. There is often recognizable a curious, instantaneous effort to develop the object of attention—that is, to analyze it, explain it, call up associations for it, to assign a place for it in our scheme of knowl-

edge. And this is the point at which the student's effort must be directed in cultivating steady attention.

He constantly meets things that are not directly interesting but that need to be considered at once, for the good they will do afterwards. He is therefore under the stern necessity of making a practice of concentrating his attention by force of will, and as soon as it is fixed, of seeking by every means to start trains of thought about the subject, to develop it, to make it grow upon the mind, so that there will promptly arise a direct interest in the thing itself. Then the mind pursues the subject for what there is in it.

It has already been pointed out that if the student's great purpose is strong and clear, and constantly kept in view, it has a profound effect on his present labors. It prevents the shiftiness that makes the average life so ineffective. This remote interest can never be lost sight of without disaster to the student's intellectual growth, for it is the anchor of his life. Local and present difficulties are overcome, instead of being dodged, only in the presence of a far-off, permanent, over-powering good that is constantly kept in view.

Dun's great commercial agency secures and furnishes to business houses information concerning the commercial standing and integrity of every business man in the country who wishes to have dealings with them. It asks the individual himself to give the details of his own business standing and to give references, from whom the agency can make independent inquiry about him. One of

the curious and apparently irrelevant questions that it asks is, "Is he married?" What can the answer to that question have to do with a man's commercial standing and integrity?

In the long run, and in determining the average value of men, the answer has a good deal to do with them. A family dependent on him gives to a man permanent pleasures that he will not readily forego, and life-long obligations which as a rule he will not voluntarily lay aside. It is not so easy for him to "quit and begin over again." It turns his business into a means to a higher and permanent end. He is more certain to have steady habits, to conserve his powers for legitimate purposes, to bend his energies steadily to the accomplishment of what he undertakes. His family is the surest pledge that he will make a success of himself, because his attention is permanently concentrated on one object. And because his attention is permanently fixed on that one object, he will also fix it, by force of will or in any other possible way, upon every detail of his business.

Such a permanent interest as the student's ambition for an education, and the desire to realize clearly conceived ideals and willingness to make sacrifices for them, if allowed to exercise their full influence on the details of the daily work, throw those petty details into an entirely new light, give them an interest of their own, as a necessary part of the great whole. The perfection of any part of our knowledge seems to bear a direct rela-

tion to its importance in the scheme as a whole. Whatever seems unimportant to the main purpose is not likely to receive the attention of the individual, and if it does not receive his attention it will be indefinite, hazy and worthless.

The woodsman who spends the prime of his life in the forest, hunting information about pine lands, develops all the skill of an expert. He sees every pine, can estimate accurately the number of feet of lumber the land will yield per acre or quarter section, notes carefully the distances to the banks of streams, and the character of the land, whether dry or swampy. He is very alert for everything that has a direct bearing on his business. Along with this essential information, and skill in finding and handling it, he has accumulated a large mass of collateral information. He thinks he knows the different kinds of trees in the forest well. He would resent an insinuation that he did not know all about elms. He can recognize one as far as it can be seen. But if he were required to give the information on which to base a scientific definition of an elm-tree, if he were asked to describe the peculiar qualities of the elm by which he recognized it he might be at an utter loss. He is what is called an impressionist. He knows the elm as a whole, that it is different from all other trees; but he may be utterly unable to give a good description of the mode of branching, the shape and character of the leaves, and the peculiar way in which the bark is cracked—the characters on which the impression as a whole depends. And if he

fails, the reason is, that his attention was never fixed on each one separately.

It may sound like a hard saying, but the great bulk of what we know belongs in the same class with the pine-hunter's knowledge of the elm. It is this kind of knowledge that makes boys and girls say frankly, "I know, but I can't tell it"; and causes grown men and women to give somewhat more elegant apologies for the indefiniteness of what they know. We cannot define the commonest things, though we may know enough to recognize them, and we may know what they are for.

The reason for this is not far to seek, but much more difficult to overcome. Our knowledge of nearly all things never had its start from a sharp act of attention, followed by careful consideration and association of this new knowledge with what we already know. Like Topsy, it was not born, it only "growed," bit by bit, until we think we know a lot of things that we do not know at all. It was "absorbed." Such knowledge always lacks both accuracy and clearness of detail.

Imperfection of voluntary attention is a general characteristic of the human mind. It is the chief cause of the infinite imperfection of our knowledge as compared, not with ideal knowledge, but with what it might actually be.

A class of eight fairly bright, well-read young men was reading Irving's Alhambra, and each in turn was called upon to define and distinguish the two words

elegance and *grandeur*. Everyone made the attempt; no one felt that he did not know; but no one could do it satisfactorily. The saying from the primary grades "I know but I can't tell" was quoted to them, and they accepted it as a good description of their condition. A curious companion piece to this is the fact that in the same lesson occurred several words which none of them had ever seen before. These they had to look up carefully, and they gave correct definitions for all of them. They had all seen the words *elegance* and *grandeur* scores of times in their reading, and had often used them. When asked why they were content to leave matters thus when the very purpose of their reading was to study the style of Irving, they answered that they thought they knew.

They depended on something that they never had. They never did know the meanings of *elegance* and *grandeur* and the distinction between them. They felt something in connection with the two words and that was all. The reason for this condition of things lies near at hand. The attention had never been deliberately directed toward the meaning of either word. Not one of the class had ever studied carefully either word separately or the two together for purposes of comparison and discrimination. Their knowledge of the two words had, unconsciously and without effort, been absorbed, bit by bit, during a long period of time, from the various contexts in which they had been seen and heard. These students saw the distinction between the words "through a glass,

darkly." Not one of them had ever attended to the elements that go to make up the conception of *grandeur*.

The facts set forth in the preceding paragraphs have another important lesson for the student. Not only was the knowledge of those young men very imperfect, but the chances, as shown above, were all against their ever improving it. The two words with which they were more or less familiar and which they were likely to meet again at every turn whenever they read good literature, were left without attention; while other words, which they had never met before and were never likely to meet again, they studied very carefully. This apparently strange performance is not abnormal, but perfectly characteristic of most people.

Direct attention to the significance of those words, *when they were first met in the student's intellectual career*, would have resulted in an analysis of their meaning and an accurate understanding of what they stand for. If that had happened at the outset, every later recurrence of the word *grandeur* would have increased its significance. Thought could work upon it, the idea could grow. Every new context would add some new suggestion to the old meaning, because the word was understood. Without this clear understanding of the idea from the outset there is no nucleus to which new experience can cling, and it fades into nothingness again. It may be laid down as a mental axiom that knowledge of any subject cannot improve, no matter how much it is studied, unless strenuous attention is given to the first stages of

that knowledge, so that there will be a nucleus around which the later additions can gather.

If attention is not carefully concentrated upon the first steps, it is not likely to be later; it is not easily fixed upon what is already "familiar." Our lives are full of the proof of this truth. Men and women listen to soul-stirring sermons and sing inspiring hymns without a twitch of muscle or a tinge of color in thought or feeling,—not because they do not believe them, but because attention has been withdrawn. The performance of these things has become habitual,—it is a mere beating of time. Steady attention to what is said and sung would result in a religious upheaval. Most of our reading is like this. The movement is mechanical; there is no thinking. The idea ceases to develop and the attention is withdrawn. Like the organ-grinder, we turn the crank all day—and are utterly deaf to the tune. This is the pit that the student falls into, and steep and slippery are the sides thereof.

It is infinitely more difficult to make a healthy tree out of a scrubby little plant than it is to attend carefully to the plant from the time the seed is placed in the ground. It is the wrong start that ruins both trees and men. It is the wrong start that makes our knowledge hazy and worthless. A far-reaching interest in every detail is what secures attention to what is done at every step, and attention to each detail, especially the first in the series, is essential to success. After a tree is once well-started, it develops resisting powers of its own. It can

cope with conditions around it on its own account. And if one's knowledge of a subject is started right, by close attention, it will far more readily grow right thereafter.

When the mind has once considered a subject even in the crudest and most haphazard fashion, it is not very likely to get reconsideration. When even the most imperfect attention has once been given to a fact, it is never likely to recover from the effects of that imperfection.

It is this kind of imperfection of attention that vitiates so much of every student's work. Some details, of course, have no vital bearing on the results. One may have a very dear friend and yet not know the color of his eyes. This might be called an insignificant detail. If it were important to know, one could find out easily at the next meeting with that friend. But in a student's work, things always depend on each other. An error of detail due to lack of attention, vitiates the whole result. Once a trifle of this sort nearly forced the writer out of college. A railway mail clerk sent a letter addressed to a town in one state to a town of the same name in an adjoining state. He was apparently more familiar with the town in the latter state, habit was in its favor, the presumption was in his favor, that a letter coming from that direction was intended for that town. The postmaster held it until it came up to be advertised. He had doubtless handled the letter every day. But attention to the name of the state had nothing to do with the matter. That had been "attended to" long ago. The chances indeed were all against its being attended to, because, had not judgment

been pronounced? The necessity of advertising created a new situation; and then the address was carefully noted and a very important business letter was forwarded.

The same kind of importance attaches to the details of a student's work, because each depends on the others for its value. Of his work especially it is true that there are twenty ways of doing it wrong and there is only one way of doing it right. There may be a hundred steps in the process, and a single error at any point destroys the value of the whole. It is only when the vital importance of each detail to the value of the results as a whole is fully realized that attention is likely to be habitually concentrated on each detail when it is first dealt with.

The worst errors of the student are due, not to ignorance but to lack of attention at every point to all the conditions of the problem or question that he is dealing with, which he really *understands* as well as anyone does. It is not ignorance, but inattention, that spoils so much of the student's work; whether he is solving a problem in algebra, translating a Latin sentence, or making a chemical experiment. One error in the writing of a *plus* or *minus* sign, or in the use of a conjunction, or in carelessly using a re-agent from the wrong bottle, spoils the whole performance. Many never learn to avoid this kind of error. In every instance it is a case of doing one thing and thinking of another, of "keeping the hands at work and giving the head a holiday." Chronic lapse of attention from the vital details that make up the whole of an algebraic problem or the problem of a human life is what

keeps the ninety and nine out among the barren hills of failure. And steady, strenuous, habitual concentration of all the powers of the mind, so that each detail is correctly dealt with, is what guides the hundredth man through the beautiful gates of success.

CHAPTER VI.

EFFECT OF MENTAL ALERTNESS ON SCHOLARSHIP.

One of the ends to be sought in the training of attention is a habit of mental alertness. Facility in directing and riveting the attention will grow silently with the years. But in addition to that will be developed a state of expectation, a feeling that things will happen. Even though the mind may often be mistaken about what is going to happen, the chronic attitude of alertness keeps it ready to receive what is coming. It is this attitude of readiness that makes the acquisition of new knowledge so easy and effective in the trained scholar.

The surest way for either a small boy or a man to do the least amount of work with the relatively greatest expenditure of energy and waste of time is to bring his hoe down at every stroke with just enough force to miss cutting the weeds. There is always a pathetic feature about the second stroke of the hoe at a weed. The worker has reduced himself to a minimum of courage by previous failure, for courage does not thrive on failure. But he also reasons that the weed, being already half cut, does not need so hard a stroke; whereas in reality the weed, already wounded and limp, is harder to cut than if it had been done at the first blow. The lack of attention

constantly results in failure to adjust the effort accurately to the results to be accomplished. Of course, the real cause of the inefficiency may be laziness. But the lazy man is always the hardest worker relatively, because he accomplishes the smallest possible results with the effort that he does make. Keeping busy, either voluntarily or under compulsion, is no sign that valuable work is being done. Half as many strokes of the hoe, carefully gauged so that just a little more than enough energy is applied, will cut more weeds, and cut them better. Concentration of the mental powers on the work in hand makes weed-cutting easier. It results in more progress with less effort.

A hot-air furnace can be made to devour tons of coal without ever heating a single room. The stoker only needs to be so listless that he does not put in quite enough coal and fails to regulate the fire properly. The coal and his time are utterly wasted, because his mind was not given to his business so that there might be a careful adjustment of the fire to the work to be done. The main object is entirely missed because the attention is not concentrated on the little difference between failure and success. Just a little more time, a little more coal, and a little more brains, all of them available, represent the difference between a cold house and a warm one. All real efficiency is represented by the surplus energy, by the last small margin of effort. But that last effective addition to ordinary fruitless effort is never made unless the attention is riveted on the results to be attained, which converts the effort into a means to an end.

Half the mental energy of students is worse than wasted because it produces no results; it cuts no weeds, it heats no rooms. An obscure impression will not remain in the memory at all, and if by chance it is recalled, it is valueless because it lacks clearness of detail and there is always uncertainty whether it is in the right place when it does come back to the mind. Now the clearness of an impression depends directly on the degree to which the mind was concentrated on the subject when that impression was made. The value of the first impression depends on its vividness, whether the matter under consideration is a rule in algebra or the beauty of Minnehaha; and vividness depends on the intensity of attention.

Steady attention makes the student's knowledge authoritative and reliable. He knows that he knows it. It is easy to remember, and there is no need of constantly verifying it whenever it is used afterwards. Under such conditions a spirit of confidence is bred which makes vigorous mental action easy and pleasant. Confidence that what has been done is correct, because carefully attended to, makes new work stimulating instead of depressing.

Half the human race, even in civilized countries, dies before the age of twenty-one. Many disasters resulting in death are unavoidable. But at least a very large proportion of the deaths that occur before the natural term of life is complete are due to inattention to "minor details." In an algebraic problem these details have their true value revealed in the answer. The answer to an error in the

course of life is often death. One man breaks his neck by walking through a skylight, another is killed by a falling brick, another is sent into eternity by an explosion or a street car. Legions of lives have been lost or permanently crippled by measles or scarlet fever merely because the sick ones did not stay in bed long enough. Neglect of the first chill or tickle in the throat is the *plus* or *minus* sign in the problem, and the answer is often pneumonia, consumption, death. In all these cases it was failure to attend to details that caused the trouble. Some one committed an avoidable blunder.

The real importance of a detail is never understood unless it is attended to. A detail cannot be safely neglected until it has been attended to and the mind has had an opportunity to pass upon it. The argument can, of course, be made that constant, strenuous attention to every detail would produce exhaustion, and that is true. But habit makes even attention easy. And it is not a question whether, at a given moment, the mind shall be attentive or asleep. During waking hours it is always occupied with something. The only question is, shall it be occupied with the business in hand. If the mind is in a theatre while the body is left to the care of the spinal cord while it crosses the street, there is likely to be a collision. It is not a question of wearing out the mind by constant attention, but of keeping the attention fixed where it belongs.

What makes it so difficult to train the attention is that steady concentration does not seem necessary. In

the ordinary events of life, it is possible to patch up a failure by doing the work over again. The consequences of inattention and error are not grievous enough to startle the mind into a state of permanent alertness. We are to a large extent protected from the consequences of inattention. But if men would take a long look around them it would become evident at once that only a very small percentage of men and women are successful in any of the callings of life. And this is so because of their chronic indifference to each detail as it comes up.

Whether a drop of water shall go into the Atlantic or the Pacific may depend on a little gust of wind on the Rocky Mountain water-shed. After it has fallen, no one is likely to bring it back. Whether a whole passage under translation shall be misunderstood may depend on the careless treatment of a little word of only three letters.

Nearly all wild animals have this mental alertness developed in an intense degree. Birds and beasts cannot ask the question that the little child asks, "What comes next?" But they all know that something serious is likely to happen at any time, and they are in a state of chronic readiness. A robin will hardly pull a new-found worm out of the ground without first taking a careful look around. When the humming-bird is perched, its head is in motion all the time. That state of mind is what makes it possible to deal effectively and correctly with everything that comes up and as soon as it comes up.

This chronic keenness of the mental powers bears fruit in swift and accurate results. Expectation may

often go wrong; but no kind of result will escape attention. When I was a young boy my older brother and I hunted the cattle every night for miles up and down the river bottoms. I have often been impressed since with the fact that things are not what they seem; but even yet it seems to me that a cow-bell is the most deceptive thing in the world. It was always so important that we should hear the bells and correctly fix their direction that our powers sometimes seemed to run away with us. We seemed to hear them where they were not. These were not imaginings of a roving fancy. We had to deal with hard, cold facts, but in our anxiety to hear the bells our senses deceived us. Alertness led us into some mistakes; but we never failed to hear the bells when they did ring within ear-shot; because, for the time at least, they were the only object of our lives. But there is not much danger from over-alertness. The danger lies in the other direction.

The timid little wild rabbit seems to be anxious all the time. Its senses are acute and nothing escapes its notice. But the skunk is extremely careless. The former's future depends on its present attentiveness. The latter has an obnoxious means of defense. It can be deliberate and careless because it is not obliged to be alert. And here lies open before us the reason for the chronic carelessness and inattention of civilized youth to the strenuous things of life.

Society protects its individuals from harm. We delegate our alertness to the police department and the

fire brigade. The search for food and other comforts rests upon the shoulders of the older members of the community. The mind, during the period of its development, is entirely relieved from the stress of life. If the habit of steady and close attention is developed during that period, it must be entirely voluntary. There is no coercion of stern necessity. The conditions for the symmetrical development of the intellectual powers are ideal in the lives of American youth. The educational labors placed before them are carefully selected. They are so graded that they cultivate the spirit of hope and the desire to make the struggle for mastery. Ideals are fostered. But the factor of necessity is eliminated and the opportunities for carelessness become terrible temptations because no fatal consequences immediately follow carelessness and inattention.

The importance of the will in the student's success will be discussed elsewhere. But he needs to remember that the habit of steady and prolonged concentration of his mental powers, however this attention may be attracted or riveted, is the indispensable condition of accurate, rapid and useful work.

CHAPTER VII.

OBSERVATION.

The senses either directly or indirectly furnish us with all the materials of human knowledge. All the objects of love and hate, pain and pleasure, come into the world of our thought through the medium of the eyes and ears and other organs of sense. Observation, in its broadest sense, is therefore the first great step in the development of knowledge. It is not, however, the simple process that the uncritical mind usually thinks it is. Good eyes and ears are no guarantee of good powers of observation; for if it were so, defects in those powers could be cured by spectacles and ear-trumpets.

Nor is mere intentness in looking at a thing a sure mark of good observation. A calf may be an adept at gazing, but very much of a fool, even from the calf point of view. As it stands and looks at you through the fence, it is manifestly intent enough upon what is passing before it, and you may be reasonably sure that it has a pair of good eyes; but there is no sort of guarantee that by gazing that calf has learned a single thing.

The controlling factor in observation is not the senses but the mind. One cannot drink water without swallowing; no more can anyone see or hear—observe—

without thinking. Observation of any kind really involves the action of all the powers of the mind. Observation means both looking at and seeing into a thing; that is scrutiny; and there is no real scrutiny without attention, comparison, discrimination, association and reflection.

Good observation involves not only looking at a thing but analyzing it, taking it to pieces, so that one may know what it is made of. Many people who live in sections of the country where granite is the common rock, do not even know its name. They simply know it as "rock". Others, people who have seen other kinds, know enough to distinguish granite from limestone; but they do this "by the look of the rock," and not from any detailed knowledge of either kind. They know that limestone is gray and granite another kind of gray or even pink, and coarser. But anything like real observation never entered into the question. Their knowledge of rock was forced on them from the outside, not developed by any internal mental activity.

In order that there may be any real knowledge of granite it needs to be taken, at least mentally, to pieces. A real observer, though he may never have seen a piece of granite before, will see immediately that it is not a simple material but is made up of three kinds of minerals; and that they are very different from each other—one the scaly mica, one the more or less transparent, very hard and glassy-looking quartz that breaks unevenly, and third, the moderately hard, white or pink feldspar that breaks with a smooth face. After he has thus taken the granite apart

he really knows something about it. He can put it together again mentally, and can tell why granite has its own peculiar color of gray or pink and how the combination of the three minerals produces it.

There is another vital step in the process of observation. After the granite has been mentally taken apart and put together again, after the observer has exercised this rather unusual gift of second sight—to steal a good word from a vicious environment—after he has made the analysis, or while he is making it, he will compare the rock with other things of the same kind. Either mentally or by means of specimens actually at hand, he compares it with gneiss and the rest of the granitic series. And now he is in a position to judge of the quality of his particular kind of granite. He knows where it belongs among its kind; knows whether its "grain" is coarse or fine, whether it will make a good building-stone or is good for nothing but a road-bed.

The observer may now stop, or he may carry his observations to any length by making engineering tests concerning the strength of the rock and chemical tests on the minerals it contains. But whether he goes on or stops, whether his knowledge of granite remains relatively deep or shallow, it is valuable, because the process of getting it was correct. It may not be absolutely accurate, but *more mental action of the same kind will make it accurate.*

It is clear then that observation, in its best sense, is not a simple process; but involves the exercise of all the

powers of the mind. It is a question of getting at the facts. And what is true of granite is true of a Latin or a German sentence or of any other subject. It involves analysis. A knowledge of a sentence involves taking it apart, consideration of the rules of construction, a knowledge of the words and their meanings. When it has been analyzed, so that its components are known and their relations to each other are clearly understood, it can be treated as a unit once more; and its relation with all the rest of the passage can be intelligently determined. A piece of knowledge that has been thus dealt with is a permanent acquisition. As long as the fire of the intellect burns that bit of knowledge will glow.

Defective observation furnishes nearly all the stumbling blocks in the path of the intellectual life. The materials of knowledge upon which the mind depends in making up its judgments are so uncertain and unreliable, that half the effort of a lifetime is spent in tinkering into usable shape the knowledge that we already have.

No observation at all on a subject is infinitely worse than even poor observation. Second-hand knowledge, the bulk of the contents of our minds, is not what colors our thoughts and gives form and force to our expression. The mental powers cannot play without blocks. Nearly all American children know something about bears; but most of them never saw one. They have no good image of a bear to think with. But let a child once see a single bear; that bear will be forever after the type of all the bears it reads about. The size and shape, and move-

ments of that particular bear have affected the imagination for life. That is the picture that always returns whenever "bear" is mentioned. It is the one real thing, the one case of actual observation, that has yielded a fertile idea. It looms out of and gives meaning to the great mass of wordy stuff that the child has heard and read about bears. No matter how many bears may be seen afterwards, that first image, which came when the mind was wide awake, remains the type and most interesting instance of "bear observation."

Even when the mind is dealing only indirectly with facts, when it is romancing most vigorously, the power and beauty of its work depend upon a vast store of actual facts garnered by long and close observation. Great power of expression is developed only by the mind with great powers of observation. If it comes constantly in contact with actual things, its descriptions are vivid, its style is lucid; it leaves upon the reader an overwhelming sense of mastery. What is said has the flavor of authority, the reader submits to be taught because the very adjectives and figures of speech reveal real knowledge. There runs through the style an element of power which is derived only from long and close familiarity with facts.

As there can be no real power of expression or style in language unless the mind is equipped with a large body of concrete facts, so no mere "strength of mind," without such facts, will ever make a real scholar. Bacon

has given us a picture of a body of men with powerful minds but with little substantial knowledge. He found himself, at Cambridge, England, "amid men of sharp and strong wits, and abundance of leisure, and small variety of reading, their wits being shut up in the cells of a few authors, chiefly Aristotle, their dictator, as their persons were shut up in the cells of monasteries and colleges; and who, knowing little history, either of nature or time, did, out of no great quantity of matter, and infinite agitation of wit, spin cobwebs of learning, admirable for the fineness of thread, and work, but of no substance or profit".

One might listen till the end of the world to lectures on the principles of Zoology and not get as much really valuable knowledge that will *cling* to the mind as one may get by looking ten minutes at a fly with a pocket lens or even with the naked eye. Neither child nor man can get any real grasp of a subject that has not been introduced by a preliminary course of actual observation. No strength of mind in either teacher or student can take the place of facts. One might read volumes on the doctrine of evolution and become a firm believer—and yet be as helpless as a baby in the presence of an unbeliever. A little chloroform; a scalpel and scissors or in case of dire necessity a jack-knife and a tooth-pick for tools; a rabbit, a bird, a frog, a tadpole and a fish; and the time and patience to dissect carefully and compare their arterial systems, would be worth a library full of books to the would-be defender of the doctrine. A man cannot be frightened away from his facts.

One may, by means of rules of grammar and rhetoric, make faultless English, but it will be lifeless too, unless the mind is familiar with the best English that has ever been made. We accomplish far less by rule than we do by observation and imitation. A careful study of a few great books like Shakspere and the Bible puts the student in a position to tell whether the rules are good or not. If he has often tasted the real thing, he is able to judge of the value of a recipe.

Our education is too wordy. We know too many things and do not know them well enough. Words are excessively poor substitutes for things. We strain and groan inwardly to grasp the significance of what is said, when a simple illustration would make the whole thing plain, when a single sharply observed fact would turn the explanation into child's play. "Much study is a weariness of the flesh" because there are not actual facts enough from personal observation for the mind to make images out of.

If you want your feelings stirred, a good description of a mountain storm will do it. But if you want them singed for life, if you want to know mist and rain and wind and thunder and lightning at first hand, if you want a *standard* that will serve to measure noise and storm by as long as you live, sit out doors on your bundle of bedding, near the foot of Yosemite Falls at two o'clock in the morning. Be sure that your stomach is empty, too, even the lion hears and sees more things and thinks

more surely and quickly—he is a better observer when he is hungry.

We are made to believe too many things by the persistent noise and desk-pounding of the talker and by the ceaseless iteration of the writer. Slowly but surely beliefs are slipped into the pigeon holes of our minds without our having ever thoroughly analyzed them. But when a mental crisis comes, when the real test of putting into actual use what we have acquired comes, then it is easy to see and feel the difference between a fact that has been carefully observed and one that has been heard about. Even with the best of opportunities for observation we are obliged to accept many things on hearsay, at second hand. But no student can be considered a success who does not seek to verify at the earliest opportunity information thus received from others. We are all under the temptation of persistently using second hand information even when it is possible to make a personal observation for ourselves. The writer once took a whole course in Physical Geography without going out of the schoolroom to verify a single statement of the book. The whole subject was a mere matter of words.

The grave danger everywhere in education is the almost irresistible tendency to get the information that is wanted, in the shortest and easiest way. That way is through a book. It is the line of least resistance. In the short run, it is profitable to get all information at second hand, because it is easier; in the long run it pays to be an independent, accurate observer, because knowledge se-

cured in that way is vivid and permanent. There is an almost religious power of conviction in a fact, which mere words about that fact will not even begin to rouse.

CHAPTER VIII.

GROWTH OF THE POWER OF OBSERVATION.

The ability to observe for one's self seems to be born with some men. In others the growth of this power is so slow, that even in their later years they seem unable to see what is before them. This slowness of improvement is due to the fact that the power of observation is not a simple thing, like staring at a post, but a name for the concentrated application of all the powers of the intellect upon the object of immediate attention.

It is easy to build a house, and it grows fast after it is begun. One thing can be done at a time. If the power of observation could be built in this way, on the principle of "one thing at a time," by attending first to the memory and then to the power of thought and then to the power of attention, the steps of the process could be watched, the progress made could be easily measured and one could decide what needed to be done next.

But observation is not built; it grows, like the human body. Our physical growth would be a fitful thing if it were regulated by ourselves. Length and strength of arm and leg, and size of brain are all provided for at once. Growth is imperceptible and yet certain because it takes place in all the parts at once. No one part can grow

while the others rest, without producing a monster. We cannot comprehend it or keep track of the details; the responsibility, if we had to assume it, would overwhelm us at once.

It is this disastrous assumption of responsibility for things with which he need have no concern at all that raises the mountains of difficulty before the student. For the physical health and development it is enough to know that judicious eating and exercise will make the body grow. The laws of life attend to that, if we attend properly to the matter of food. And so of the development of intellectual power. We can watch the increase in our information; but the more vital thing, the increase of power, takes place so slowly that it cannot be observed; but the growth is certain because it is ubiquitous.

Two important conditions enter into the cultivation of the power of observation; and without a proper realization of these, it is futile to try to understand the process. We attend to and observe closely only those things which have some sort of interest for us; and we see only *what we are looking for.*

When the barber came away from his visit to the palace and was asked what he thought of the king, he summed up his observations with the remark that he thought the king was exceedingly well trimmed. Being a barber, he could observe this feature critically and exhaustively. His power of observation ended where his training and his interest ended. When Charles Darwin's party landed on Tierra del Fuego, the wretched natives

looked upon the little boats as marvels of perfection; because these came within range of their interests and understanding. The big ship in the offing did not attract them, they did not observe it carefully because it was too big for them.

The point is that every man's powers of observation are restricted in practice to the things that have some sort of interest for him. They must have some sort of vital connection with his life and thought in order to stimulate mental activity. The man or woman seeking culture needs to be aware that the extent to which his powers of observation are exercised depends on the extent and depth and variety of his intellectual interests.

The principle that one sees only what he is looking for, lies at the foundation of the peculiar way in which progress is made in the search for knowledge. Search implies some sort of knowledge of what is going to be found. Haphazard observation is like haphazard walking —it leads nowhere and ends in weariness.

Let us illustrate this principle from an experience common to most men and women. The vast majority of intelligent people have no reliable conception of what constitutes a good picture or statue. They may feel blindly that a painting is good; but they cannot really appreciate it because it is not in their power to make an intelligent observation of it. They have no means of analyzing it, they do not understand what combination of qualities constitutes a good picture, they cannot think separately of each of its qualities. They have no theory

of art, no standard to go by. They do not know what to look for.

I should not dare venture an opinion on any work of art, because I never had any teaching even in the rudiments of the subject. At one time a picture was for the most part a matter of size and color. But there came a time when I could form a humble opinion in silence. The necessary power to appreciate a picture did not come to me by much staring; I read Lessing's Laocoon. It stimulated me because it lent me the power of analysis. It taught me what the elements are that constitute a work of art. Ever since that reading art has been a pleasure to me. My opinion is worthless to others; but I know at least something about *what to look for*. A world of pleasure was opened to me through this essay because it gave me a theory of art. Even the possibility of observation was wanting till I was taught what to look for; and this was done by placing in my hands some of the general principles of art.

Charles Darwin relates an instance strikingly illustrative of this general inability to see things without the help of theory or general principles. When still a young man, he accompanied Sedgwick, the great geologist, to Wales to study the Cambrian rocks and collect fossils. At Cym Idwal they literally trod upon the evidences of glacial action in the past. Moraines, stray boulders, all the most striking evidence of glaciation lay exposed before them, mutely pleading to be seen and interpreted. The facts seemed actually to be thrust upon them. He

wrote in after years that if a house had been burned on the spot, the ruins could not have furnished better evidence of a fire than all these things gave of the former existence of glaciers there.

But neither of these men, the one soon to become a famous scientific observer, the other already famous, saw anything at all. They were as blind to the facts and their meaning as a ploughman would have been. The failure to see was certainly not due to stupidity, nor to the lack of training; but solely to the fact that there was as yet no glacial theory by the help of which to look for and see these facts. *Nobody else saw anything.* After Charpentier, who was familiar with the work of the existing Alpine glaciers, had suggested that the Alpine boulders scattered over the Jura mountains far away from their origin, had been carried there by glaciers, and Agassiz had expanded the "glacial theory" to explain the same kind of phenomena elsewhere, it was easier to see the glacial phenomena, scattered as they are over all of northern Europe. Things which fifty years ago were hardly seen at all, now constitute the materials of a whole branch of geological science. The work of the great ice-sheet, in carving valleys, scratching rocks and transporting gravel and boulders, and the work of the floods of water from its southern edges in sorting soils, changing ancient river courses and cutting new ones are as charming to read about as any romance can be. Men see the facts now because they are looking for them.

It is not possible to tell, even with the help of the-

ory exactly what ought to be found; many mistakes have been made which have thrown men off the trail of truth. But it is known that mighty forces were at work and that they produced consequences that can be unravelled. The whole point of view is different from what it was in Darwin's early days. After the theory of glacial action in the northern hemisphere became thoroughly understood the knowledge of glacial geology grew by such long, swift leaps that it would seem as if the men of former years must have been utterly stupid not to see the facts before. Facts for which an explanation is already at hand are easy to find, and when found are easily fitted into the scheme of facts already known. Facts for which no explanation is ready are not likely to be either seen or looked for.

This is why the world's progress in learning things has been so slow, and why the course of true knowledge is so zigzag. Progress is largely a matter of weapons, in the purely intellectual life as well as in war and commerce. A new force like electricity no more surely changes the face of the business world, the long-range repeating rifle no more surely transforms warfare, than a theory, even though only partly true, multiplies the powers of the thinking observer. There must be pioneering done in intellectual things to get some general explanation, and then the solid road-bed is built by working backwards by the light of the new theory.

So it is that observation of a fact of any kind involves two important sets of acts. It must be analyzed,

taken apart, so that its nature may be understood, and it must be explained, associated with all the other known facts of its kind and treated as an illustration of a general principle or as the effect of some cause.

It will only be necessary to give some further illustrations to show that mere isolated facts, that have forced themselves upon the attention, but have not been really observed, are of very little value to the intellectual life; and that there can be no good observation unless the mind is equipped with general principles, so that, as soon as the facts come under notice, they can be brought into close relation with all the facts already known.

If two men walk down the dry bed of a western stream that flows only during the winter, both will see rocks and gravel and sand. But here they part intellectual company. One of them, who knows something of the effects of water action, perhaps only that such a force as water, acting constantly in one direction must produce well-marked results, can see, as he passes from the slopes to the level stretches, that the stones become smaller, gravel is more common and is succeeded by stretches of sand. His active mind grasps the fact that the lessening force of the water drops the stones first and carries the sand farther along. Explanation such as this is a violent stimulant to further active observation; the subject grows. He is struck by the fact that there are no rolling stones in the steeper parts of the stream. They are all packed and can be safely stepped upon and trusted to keep their places; because

the water would push a loose stone along until it imbedded itself in a firm resting place. Lower down, the little stones, if they are shingly in their nature, are laid like the shingles on a roof—the long way parallel with the course of the stream, the lower end projecting and the upper end buried beneath those farther up. To the real observer there is an explanation for the fact. That is the position of least resistance, the only one in which they can shed water. If the upper end of a stone projected, the water would topple it over and push it out of place.

These explanations are all so simple that to give them seems ridiculous; but that is the gist of science and sound scholarship. Because he *thinks*, the arrangement of rock and gravel and sand is as orderly as the words in a line of English poetry. Every fact is a record left by some force that has been at work, and he interprets the record.

The other man is not like unto him. He sees the rock and gravel and sand, but the only observation that he makes as he passes down the stream-bed is that the walking is hard. He leaves the bed and takes to the cow-trail on the bank, for the same reason that the cow does. He has the cow's type of mind. There is no further observation because the relations of things to each other are not seen. The first few facts arouse no thought, so the rest all remain entirely unobserved.

In succeeding chapters great emphasis will be laid upon the matter of right thinking. It is only necessary

here to point out how a mind well-equipped with general ideas can assimilate new facts, how good observation depends on the ability to dispose of each new fact, as it comes up, as a part of some system of thought.

Every reader can in later life recall some of the most interesting experiences of childhood and see how much was missed in the way of new observations because the real significance of the things that were seen was not understood. It is well for us that childhood is the most impressionable age, the time when the retentive memory is at its best; because, if it were not so, while the power of thought is yet undeveloped, while there is yet little capacity for thinking out the relations of things to each other, there could hardly be any memories of childhood. Even at their best, the memories of childhood are wofully defective because so much was missed, so much remained unobserved, for the reasons given above.

In my early boyhood I swam and fished and poled canoes in a river that was wonderful to me. It seemed to be made for the use of boys—moderate in size, but large enough for our capacities. It seemed to have a very obliging nature. There were plenty of deep holes for fishing and swimming, and always on the opposite shore was a sand-bar. It was a great convenience to have a sand-bar to dress and undress and play and burn our naked, wet backs upon; and a sloping bottom on which to wade straight into deep water. And when we did not want to swim, things were admirably fixed for wading. The

shallow riffles always stretched from the lower end of one sand-bar to the upper end of the next bar below, which was always on the other side of the river. There was also one remarkable inconvenience, which was felt most keenly when we wanted to cover distances in the canoe. Then the river was made up entirely of "bends," and the cattle traveled faster than we did by cutting through the woods at every bend and coming to the bank again below. Of course, this was exasperating but that is all we knew or felt about the facts.

I remember each of these things distinctly, by itself, because of constant association with them during a long period of time, because they all came in touch with my desires and necessities. But I never thought of them all together, holes and sand-bars, riffles and bends, as the effects of one constantly working cause, as being apparently related to each other by the laws of nature. If I had been wide awake to the fact that in one place the bank is steep and the water is deep because the current there drove against the bank, and that below this place on the same side of the river is a sand-bar because the current slackened when it struck the bank and had to drop the material it got there before it gathered speed again; and if I had known that in a winding river the current dashes first into one bank and then into the other, I should have known *why* our sand-bars always had holes opposite them and why the riffles crossed the river obliquely. And I should have seen a multitude of things that I never saw in my boyhood at all.

There were some funny little "half-moon lakes"—they looked big to us then—hid away in the river bottoms, too, made especially for us to catch frogs in. We were very familiar with them,—for had we not hunted hell-divers in vain and peppered the frogs daily to see them jump off the logs into the water? But many of the best of all these facts were utterly forgotten. They were linked only with our temporary interests and when these passed away, the facts themselves were dumped on the rubbish heap of forgetfulness.

When later in life I became familiar with the principles of water action, whither should my mind turn for illustrations but to the rivers of my boyhood? All the facts that I could remember underwent a wonderful transformation. They became related to each other; all that I remembered was explained. But there were great gaps of information left unfilled. Observation had not followed the facts, that they might be understood. They had merely been thrust upon the attention. Would the memory of a crescent pool in the woods be less vivid if I had observed that it was once a bend in the river; that the latter at high water had taken a short cut and made a straight bed for itself and left the bend in the woods, and choked it up at both ends to be a frog-pond for the boys?

The observations of even the most impressionable period of life are fatally defective, from the student's point of view, unless they are made in the light of gen-

eral explanations that link all the facts together; because it is the desire to understand all the *connections between facts* that makes observation complete and exhaustive.

CHAPTER IX.

DISCRIMINATION.

If all the material objects in the world were spherical, we should never think of making *shape* a subject of study. The work of comparison could never begin where there were no differences that could be detected. And, on the other hand, if all the objects of knowledge were entirely different from each other, so that no two had any qualities in common, there would be no basis for the growth of knowledge. No one ever feels called upon either to compare or discriminate between an apple and the sound of thunder. The powers of the human mind can be exercised only on things that are alike in some repects and unlike in others. It is only in the presence of different shapes that the mind begins to deal with the subject of shape by itself. It is only in dealing with different colors, that the subject of color becomes a distinct subject of thought.

At the very foundation of the intellectual life lie two mental processes that are as mutually dependent on each other as the reciprocal strokes of a pendulum. These are discrimination and association. The latter will be dealt with in a separate chapter. The process of discrimination is carried only as far as the individual's

interests require it. Most men are very poor judges of cloth because they have never cultivated the power of discrimination in that direction. They have a hazy knowledge that many differences exist, without knowing or being able to tell in what those differences consist. They can tell the difference between calico and woolen cloth; but not between woolen cloth and its cotton imitations. The larger differences between things are always striking enough to take care of themselves. It is when things are *very much alike* that the trouble begins; and then the power to discriminate needs to be consciously trained. And training makes the expert.

Sound scholarship depends largely on the power of discrimination. To illustrate its importance, I shall take an example that seems utterly insignificant. In so small a matter as the failure to discriminate the forms of two letters of the German alphabet there often lies a terrible possibility of evil to sound scholarship. I have known scores of students of sound mental endowments who persistently ignored the slight difference in form between the German ſ (*s*) and f (*f*), and confused them in the pronunciation of words until no amount of criticism or even censure seemed able to correct the habitual error. The initial error was so slight that it would seem to come well within the limits of blunders that can safely be neglected. But the confusion produced by the failure to make this single little discrimination between two printed letters of the alphabet and to preserve it carefully in practice, ruined the pronunciation of otherwise

good students. But there was another and far more disastrous effect. Every word that contained one of the mis-learned letters was likely to be looked for in the wrong place in the dictionary. The words were misunderstood, the context would throw no light on their meaning, they were dull, unorganizable elements, they would not fit anywhere. German reading was a farce; knowledge of the German language was hopelessly defective. Right judgment was impossible.

This failure of discrimination was not due to poor eyesight, or to lack of intellectual capacity; but to sheer indisposition, almost stubborn unwillingness to attend to differences that seemed too minute to be worthy of consideration. This one instance is only a sample of quite a number of errors that are possible in dealing with the German alphabet. And at every point in the student's career the same problem comes up, in every day's work in every subject that is dealt with. The more minute the differences between two things, the more likely they are to be overlooked; or worse still, if seen, to be ignored, until the very capacity for observing those differences seems to be lost.

The vast importance of this matter comes home to the student only when he realizes that every fact that comes to him he uses at once as a tool with which to secure new facts. If each fact, when it is acquired, could be safely tucked away in a mental pigeon-hole where it would have no effect on the work of securing and dealing with other facts, this subject of careful discrimination

would not be a serious matter. There are various reasons for poor discrimination. But the most serious one is humanity's common failing—what Bagehot calls "an irritable desire to act directly." The lack of patience to make careful preparation and weigh all the conditions before each step is taken, results in a failure to discriminate.

The thing chiefly to be desired for the student is that his knowledge of everything he touches shall be accurate, as far as it goes. It is impossible for him, at his stage of the work to know all there is to know, even about the German alphabet. But discrimination in this and in all other matters needs to be made so thorough that the student shall not think that a fact is one thing when it is really another. Flies burn off their wings in a gas flame because of a lack of discrimination. The student just as surely destroys the keen edge and the temper of his intellectual tools by failing to make a steady business of discrimination among facts.

There are great differences among people in their powers of recognizing similarities or differences. Some are highly gifted with the power of seeing analogies. In a succeeding chapter it will be shown at some length how largely all our thinking depends on the power to recognize the qualities which things have in common. Bain and others have pointed out that a far-reaching power to see likenesses among things that are apparently unlike is the foundation of what is called genius. Without this unifying power there can be no breadth and depth of

mental grasp. Many of our figures of speech are based on the recognition of similarities between things; our power to classify objects of knowledge and reason concerning them is based on this power of mental association.

But intellectual accuracy and soundness of judgment, the authoritativeness of our knowledge, depend on clear discrimination of things among which there are but slight differences. Locke has written strong words about the difference between wit and judgment which every student would do well to ponder. Wit is based on the recognition of similarities. Sound judgment is not based on figures of speech; it is not misled by similarities; does not confuse things that are in *any respect* unlike. The recognition of similarities among things leads to powerful mental grasp and to poetic beauty. But truth is built on discrimination. It is thinking of things as being alike which are in reality not alike that leads into errors and blocks intellectual progress. Accurate scientific work, scholarly translation of a language, powerful literary expression are all dependent upon the power of discrimination. What are refinement of manner, literary taste, scientific penetration? Not merely the power to see resemblances, but the power to make acute discrimination among things that look alike to others, and to act correctly on such facts.

Some people seem to have a native "feeling" for what is correct, in manners, literary style, forms of expression, conduct. It looks as if such a power must be

born with the individual; that it cannot be trained. Doubtless as Tristram Shandy was a better logician without schooling than many highly trained scholars were, so many men and women are by nature gifted with great powers of discrimination. But all men are possessed of capabilities in this respect which are but little if at all developed.

The most worthless kind of knowledge that one can have about things is such as this: that there is a difference between two words or between two trees, without one's being able to tell what that difference is. The only remedy for such a state of things is comparison, by which two things or ideas are brought together and examined at the same time, for the purpose of finding out in what they are alike and in what they differ. The trouble with most of our knowledge is that it has been gathered up in a miscellaneous way in the course of years without conscious effort to emphasize the differences between things.

There are at least two ways of doing everything. And one very dry way to study words is to sit down and study column after column of them in a formal way. But the practice of *purposely* comparing words, in the study of languages, for example, in order to learn exactly how they differ from each other, so that the exactly fitting word may always be used, changes the whole character of a student's knowledge. That is what makes him an expert, whether he is dealing with words or trees or historical facts. No matter how incomplete one's

knowledge may be at a given time, the *process is right,* and more work of the same kind will make it perfect.

The word *expert* carries with it such a strong commercial flavor that one might hesitate to use it in a discussion intended for those who are seeking culture. But what is skill in judging music, art, or literature? On what is the skill dependent that can produce a perfect symphony or painting or poem? Great power to discriminate tones and colors and forms of expression that are not recognized as distinct at all by the mass of men. The habit of very careful comparison and long training in distinguishing things that are only minutely different, are what make the expert in all departments of life.

The last degree of expertness may deal with differences so minute that they cannot be described. They seem to be a matter of indefinable feeling. The wool-buyer may be able to detect whether a bale of wool has been water-logged by means of a rope with one end fixed in the bale and the other end floating in a creek. But, however able he may be to detect fraud, the finest and best work is done in judging real wool—recognizing the minute differences that nature herself has produced on the backs of sheep. The differences that he can detect may baffle his powers of description, but he gives *correct judgment.* This power is extremely slow of growth. But the student inevitably acquires it if his process is correct. If he takes the time to make careful comparison and discover the exact nature of the differences between things, the knowledge thus gained will be his firm friend, and he

will develop, in large measure, that tact in conduct, aptness in the use of words, tremendous power of interpretation, which seem to be gifts bestowed by nature only on the favored few.

As has already been said, discrimination must cease somewhere; and in this matter we must in the end be guided by what our interests are, by what we have at stake. During my college days it would have been folly for me to discriminate the sounds that my feet made on the sidewalk at every step. I could have no interest in such a thing. But the old blind man that trod for years the same plank walk that I did, had a vital interest in the sound of every foot-fall. He could walk blocks at a stretch without using his cane; and when he reached the corner at which he turned homeward he could stop within a foot of the center of the walk, wheel on his heel and go home without using his cane at all. Blind-folded I would have been perfectly helpless; but he distinguished among sensations of the very existence of which I was unaware. If I had used my powers in my college work as effectively as he used his in the business of getting home, I should have been not only a better, but a different kind of scholar.

It is no small part of the student's work to learn to discriminate habitually, by means of *active scrutiny*, between things whose differences are small. He is not at liberty to be content, like other men, with differences that are so great that they force themselves upon him; he is under the moral necessity of looking for and hunt-

ing out the smaller differences between things and consciously stating those differences to himself in the interests of accuracy and sound knowledge.

But it must not be forgotten that mere ability to recognize differences between things does not make a good thinker. It is only one of the conditions of sound thinking. A man may have very acute powers of discrimination and yet lack, in large measure, the companion power of associating things that are really alike and drawing general truths from those likenesses. A mind in which the power of discrimination outweighs that of association is likely to be loaded with a vast quantity of accurate details, cyclopedic in its nature, but without much power of organizing this vast store of knowledge and drawing general truths from it. The mind, on the other hand, gifted with great powers of association, but deficient in discrimination, is likely to be speculative, unhampered by the quality of its facts. It will revel in flights of reasoning and its work will look very brilliant; but the results will not bear investigation, they will not stand long in the place that belongs to truth.

What discrimination at its best actually does is to furnish valuable material for the powers of association to work upon. Merely recognizing that things are different leads to nothing. Unless the power of detecting differences between things is accompanied by good power of detecting resemblances among things, there will be but little power of constructive thought, of generalization, no sweep of conception, no grasp of large and gen-

eral problems. The two powers are really reciprocal. In the well-trained mind there is constant interaction between the two. As soon as discrimination has taken a strong hold of a new fact and clearly revealed its nature,—as soon as it is recognized to be different from the other things with which it is associated and is separated from them in thought, the mind immediately seeks to bring this new fact into a mental association with other things that are known to be like it.

From my early childhood black-bird concerts have had a strange charm for me. I had never analyzed the "concert music" and discriminated the different sounds that make it up. Later in life I learned, somewhat to my astonishment, that crows, black-birds and blue-jays are all very closely related, and belong among the true singing birds. The humor of the latter fact drew my attention to the sounds they made, and I discovered a remarkable likeness in their ordinary call-notes. After that they all cawed, only in different keys. Thenceforth their music as well as their anatomy testified that they were relatives.

But the black-bird concert, with its mysterious, outlandish charm still stood out by itself. It was only long afterwards, when the close relationship of the birds and the similarity of their calls had grown perfectly familiar, that I undertook to analyze it. As soon as I began to listen for the separate sounds that go to make the concert, not only the quantity of sound, but the remarkable double nature of the music, became impressive. Com-

mingled with the liquid, musical whistle is the plain old black-bird caw. I immediately associated this element with other things that were like it, and so emphasized the difference between the two notes that enter into the concert.

This illustration seems strangely chosen; but I do not expect others to become bewitched by black-bird concerts because I have been. The illustration was selected for its simplicity; and it shows clearly the effect of education on the power of discrimination. I did not analyze the music of the black-bird until I was fairly well equipped with a variety of information bearing on the general subject of those birds. It was only after the "concert" had been surrounded by organized knowledge and it was left as an island of unreduced ignorance, that it was subjected to analysis. The extent to which we are willing to isolate one element from the others connected with it, and group it with things that are like itself, depends on the general range of our knowledge. The accuracy, clearness and variety of what we already know determines the extent to which the mind will "pick out" new materials and bring them into old groups.

The mind that has cultivated a well-balanced combination of patient discrimination and bold association and general reasoning, is in possession of the power to hunt the truth and mercilessly verify its results. It must be listened to; its work will last. Even though time should prove that some or even many of its results are wrong, yet the process of reaching those results is correct

and they mark a necessary stage in the growth of later and better knowledge. *More of the same kind of work* will remove the error and reveal the truth.

CHAPTER X.

ASSOCIATION: ILLUSTRATIONS.

Probably every normal person has at some time stopped short in a train of thought and asked himself why his thoughts have succeeded each other in the order in which they have come to him. Whether in reverie or a hard and long-continued course of reasoning, each thought, in dying away, gives birth to the next one. The mind passes, almost instantaneously, by apparently the wildest and most unaccountable dashes, from one end of the universe to the other, and brings together in thought things that of themselves seem to furnish no apparent reason for being thought of together. But there is a fundamental mental principle that governs the association of ideas that succeed each other throughout our waking hours. Why it should be as it is with our minds, is a problem that has presented itself for solution to philosophers since the time of Aristotle; and doubtless ages before his time, the skin-clad shepherd, in some reflective moment, asked himself the same question.

It is not the purpose of this book to discuss the question from a psychological point of view; but to accept the principle of mental association as we find it,—absolutely master of all our thoughts—and to draw out a little

its bearings on the problem of education from the student's point of view. Each one can find in his own experience the best examples to illustrate the workings of the principle.

One cloudy, cold and wet winter evening, I stood outdoors in the depressing twilight in a mountain-girded valley twenty miles from the Pacific, and heard the sullen roar of the unseen ocean. It was the kind of deep, resistless, muffled sound, that seemed to mutter more than speak of mightier things that it might do. That sound at another time would probably have recalled visions of cliff and beach and surf and shells and tide-pools and sea-urchins in their little pot-holes in the solid rock and the odor of the sea. But none of these things returned to consciousness. The muffled roar brought back another majestic *sound*. I had seen Niagara Falls on a sunny summer noon-day, when water and mist and sky were bright, and there was no suggestion of gloom. The roar of the ocean had called up something that was like itself.

But why, when the roar of Niagara had been summoned across almost three thousand miles of intervening plains and mountains and across the intervening years, did that deep eternal monotone bring back with it all the other qualities of that piece of Nature's wonder work and even the thoughts inspired in me at sight of them? Why did the rushing and glinting and falling of the water come back with the roar? And after them all, why did memory drag out again the solemn thoughts of

eternity and almighty power that had heaved through me in that wonderful hour? There I stood, oblivious to the cold and darkening gloom, and revelled once more in thought of the beautiful and sublime.

Why, in less than a minute, did this great complex of vision and feeling—the steadiness of this mighty thing and the sunny beauty of the day—allow me to be carried on a flash of thought to a terrible night in the mountains, when almighty power seemed to have turned anarchist, when darkness and fog and rain depressed the soul, when shock drove sleep away, when mountain-splitting thunder made the heart stand still and violated all the laws of order by refusing to die away, when Echo, that only murmured and babbled in the sunshine, growled and roared incessantly in a voice that knew no modulation, until the cliffs above us quivered with excitement?

The ocean's roar recalled something else that was like it. This *law of association by similarity* lies at the root of the mind's most wonderful work. "Birds of a feather flock together" is a law of our thinking; and maybe a law controlling the forces of the universe. It will bear much thinking about.

When once the sound of Niagara had possession of the mind, instead of recalling immediately another sound, it recalled all the other experiences that the mind went through at the time that sound was heard—not other similar sounds, but entirely different things, sunshine, flashing water, mist and rainbow, and musings on power and eternity. It may be laid down as another mental

commonplace that things and qualities of every nature, no matter how different from each other they may be, *when once they are experienced together,* will ever after tend to come back in memory together. This law of *association by contiguity* causes all the elements of an experience, no matter how unlike they are, to come trooping back together, and usually in the order in which they were first experienced. As soon as I thought of Niagara's roar, all the other things that I saw and heard and thought and felt at the same time came back until the whole scene stood pictured before me again.

Then suddenly the noise of the Falls recalled the roar of a mountain storm; but no sooner had association by similarity brought back the latter, then association by contiguity recalled all the attendant circumstances that combined with the noise to make up a model storm. And so our thought trips on from point to point of our old experiences; and all the time by the law of contiguity, the mind keeps the order of experience that nature gave, and by the law of similarity creates out of the chaos of experience an order all its own.

It is within the range of possibility that, when memory takes up the thread of former experience, one should follow exactly the course of the former experience, recalling every attendant detail minutely and in its proper place. Memory then would only drift once more exactly where the thought had traveled before. There is a type of mind that tends to be thus obedient to the law of association by contiguity. But by itself, it represents only

a lower type of mental power. I might, obedient to the law of similarity, when I see a crawling ant, recall in dull succession all the experiences of ants that I had ever had, and all in their proper order. But it would be a stupid piece of work and withal both unpleasant and unprofitable. What actually happens is, that a normal mind, in passing from one object of thought to another under the law of association by similarity and contiguity, selects the experiences that were pleasant or impressive, that for some reason or other, we cannot always tell why, have a sort of tone that distinguishes them from all the rest, and which at the same time have a pertinent bearing upon what is at the time passing in the mind.

What actually happens, in my own case, when the sight of a line of black ants starts a train of thought at all, is that I recall a terrible battle between black ants that I witnessed once in a forest. The grim and silent warriors fought till the old log and the ground around it were strewn with antennae, legs, heads and beheaded bodies. I did not see a coward among them. Every one held on until he died; and even the jaws of his dissevered head stayed locked where he had bitten last, so that his enemy still carried his head around as an unwelcome adornment.

The other thousands of droves of black ants that I have seen in my life are apparently lost to memory; I cannot recall the most of them; all there is left is an indefinite impression of the frequency of such a sight and of the numbers usually seen. The reason this par-

ticular scene associates itself so commonly with any drove of black ants that I may see, is that this experience was new to me, and striking and terrible in a way. I had often wished to see such a battle; had often read about the doughty little warriors. I was mentally prepared to be interested; I was in a state of expectation, and observed all the details. My mind worked vigorously on the subject as the fight went on. The impression it left was unusual and vivid.

The sight of a red ant much more surely associates with itself another experience. It always recalls the little red ants that crawled at their leisure through my mustache while I tried in vain to sleep on a hillside on the North Fork of the Stanislaus River in California. The reason this particular scene occupies the right of way in the association of my ideas is because it was so unique and impressive. I did not dare to kill the too familiar ants, because they were more malodorous in death than they were in life. As soon as the law of similarity has done its work and called up the hillside ants, the law of contiguity is just as effective in bringing back all the circumstances of that memorable scene. Every item in it was new and impressive on its own account. The uncanny ants recall our constant slipping down the hillside in our blankets in spite of the bed of boughs; and then comes back the thought of the donkey, who ate patiently of a rotten log because the sheep had passed that way to the high Sierras, and where the sheep have been not even a donkey can live in comfort. And

her peculiar tastes made another deep impression. I had often driven cows and colts through the deep Wisconsin snows to browse the buds of the new-made brush heaps. So we carried her maple leaves on broken boughs; but she preferred the rotten log.

All the details of that night's experience were new and striking, and so they cling tenaciously together in memory; even the little incidents of salt and pepper at the supper-making drop into place in the vivid procession of images.

It is important to realize that the question as to what experiences, what knowledge, shall be recalled and become associated with what we happen at present to be thinking about, depends on how that knowledge or experience was first acquired. The student need not now trouble himself about the "poet's eye, in a fine frenzy rolling" and seeing similarities and connections among things not given to common mortals to see. He needs to impress himself with the fact that those things are most likely to serve him afterward under the law of association of ideas, which had most interest for him and impressed him most deeply at the time that they were experienced.

There is one other case of association which can be distinguished from the two that have been described. Socrates gave an independent position to the principle of association by contrast. Our common speech, and the highest types of literature are filled with the idea of contrast and antithesis. We think, as it were, in extremes.

Angels recall devils; good recalls evil; bitter and sweet are constant associates in our thought. The "neutral tints," in colors, tastes or morals, do not seem striking enough to be easily associated in thought or to appeal to us. It would seem that things that represent extremes of difference are habitually thought of together and that association by similarity breaks down badly at this point.

But analysis of the subject has shown that the principle of contrast really comes under the head of association by similarity. Angels and devils are only the two extremes of the *same kind of thing.* Bitter and sweet are the two extremes of taste. In Pharaoh's dreams the seven fat and the seven lean kine, and the seven full and seven thin ears of corn betokened seven years of plenty and seven more of famine. The figures of the dreams are true to the fundamental principle of similarity. There is no chaotic mental confusion of years of plenty with thin ears of corn. And where the contracts are made, it is the two extremes of the same kind of thing that are involved. The seven fat with the seven lean *kine;* the seven full with the seven thin *ears of corn.* The mind, when it deals with contrasts, grasps, as it were, the two ends of all such series. Even then the points of similarity are emphasized. No contrast is drawn between things that are fundamentally unlike. We are not inclined to associate together by contrast, hot and yellow, goodness and the color blue.

Guns and powder, explosion and death have become closely associated in our minds, and we conduct ourselves

circumspectly. We are so sure that guns do not go about alone, that if we hear the report of a rifle we invariably look for the man. Certain things have always occurred together in our experience, and we make the grave assumption that they will always occur together. When one of them comes to our attention we immediately assume the existence of the rest. If I see a dog's tail disappearing around the corner of the house I "know" there is a dog at the other end of it. I have seen myriads of dogs' tails, but never a tail traveling independently. One tail, one dog. Invariable association of the two in my experience has made the association of the two in my thought inevitable. My eyes supply the tail, my mind supplies the dog to complete the association.

This is the power by means of which we are constantly piecing out our imperfect knowledge. We act all the time upon our confidence that such associations as we have become acquainted with, are permanent and reliable. I hear a thud on the porch, and invariably act in response to it, because it *means* that my morning paper has come. The dull thud has meaning only because it is associated in my mind with so many other things. That is why a single sound may determine my occupation for half an hour to come. The law of association gives all their meaning to otherwise stupid facts. Because this is so, and because the student's present business in life is to train his mental powers, a little attention to this law of association and its bearing on the quality of our knowledge, is of very great importance. All his years of edu-

cation are, in theory at least, a longdrawn voluntary effort to improve the quality of his mental action, and to secure accurate and valuable knowledge.

Now the way in which the different items of his knowledge shall forever be associated together, depends on the way he consciously arranges them when he first comes in contact with them. He is deliberately accumulating material and power for future use; and it behooves him to remember that the law of association will faithfully reproduce his accumulations, whether their first arrangement was perfect or utterly faulty. Where emphasis is laid in the beginning, there will be the facts which force their way into the memory on the slightest provocation. Flaws and errors come with what is valuable. We never recall everything. Some facts and experiences will always hold the right of way at the expense of others that are bound to lose their little vitality in the stalls of memory, until they seem to be hopelessly lost. It is vitally important that the student shall deliberately and always associate the items of his knowledge in such an order that they will teach him the most truth afterwards, "bunch" them in such an arrangement that when one is recalled it will always recall the rest. This topic will be treated more fully under Memory.

Now what is it that determines which of a thousand possible trains of thought shall become the actual one? We can at least lay our fingers on some of the elements of the answer. Thought, as it moves along, passes always to the facts that for some reason or other are the

most impressive. These are not only easily acquired, but easily retained and recalled; they seem to return almost without invitation. Others, which can be recalled only after the most careful mental "search," are not likely to play a dominant part in coloring and directing the course of our thought.

It may be laid down as a fundamental characteristic of both men and animals that we are most interested in a thing while it is new to us. That is when it makes its lasting impression. It is Nature's way of teaching her children to be careful and to make each new item of knowledge effective. Which of our past experiences shall be called upon and associated with a present experience, in what direction our thought shall run when it is stimulated into activity by a present incident, depends not only on the vividness of particular past impressions, but also upon the general drift of our more recent thinking.

In the year 1900 I sat in the sun and listened to a fine technical description of a repeating rifle that I held in my hands. The rifle made the speaker think of the coming vacation and the deer that he would slay; for he was a Nimrod, with more heart for the forest than for his books. There was no great probability that the presence of the gun would lead his mind very far away from the thought of the northern hill forests. They had the right of way.

Before October 11, 1899, that rifle would surely have set me thinking about the Chippewa sub-chief who in the depths of a Wisconsin forest, walked up to me as I

sat at the foot of a tree, and offered to sell me an old Phoenix rifle for "six or five or four dollars." But in 1900, even long after the British had occupied the two South African Republics, my whole thought was often given to the effect of modern guns on human liberty. At *that particular time*, therefore, the rifle on my knees at once associated itself in thought with the Boer war and the stout resistance that the handful of mounted farmers was making to one of the biggest and proudest armies on earth. It led me to think once more that pipe-clay and uniforms and social distinction are no longer either necessary or desirable equipments of a fighting man; that the fighting unit would thereafter always be a man, a horse and a repeating rifle. I thought of this, too, which must often have impressed itself on many British minds, that they had met the Dutch before, and who could know but they might have to do it again? Then I thought of how the final stand in the struggle for human liberty is always made outdoors in the everlasting hills. Boers, Cubans, Swiss and Welsh and Maccabees came back in thought because it was the year nineteen hundred when I looked at the repeating rifle. The train of thought which the rifle would awaken was determined by what I had been thinking about recently.

CHAPTER XI.

ASSOCIATION: THE ORIGINAL ORDER OF EXPERIENCE.

It has been said in the previous chapter that there are two strikingly different ways in which the mind may re-consider the knowledge which it possesses, and the experiences that it has had. There are two different orders or arrangements: the order of experience and the order of reason. In the former arrangement the law of association by contiguity brings back everything to the mind in its original setting. Each thing recalls what was next to it or associated with it in time or place. All things that were together once in experience remain together in the memory. If this were the only way in which the facts of our lives could be associated, our "thinking" could never be anything more than a pale, emaciated repetition of the past. There could be no new combinations in our thought.

But even the dullest normal mind is capable of taking its past experience to pieces and bringing together in thought the things that are in some respects alike. Two experiences may be thought of in succession, whether they occurred originally in two successive hours of the same day or were separated by a space of twenty years. It is

their likeness to each other that causes them to be brought together in thought.

These two ways of associating the objects of knowledge or experience distinguish two radically different types of mind. Every mind possesses both these means of association. But some minds possess in a very marked degree the power of associating objects according to their likeness; while others seem to plod along the old ruts that were worn by the original experiences.

The well-balanced mind, which keeps a strong hold of its past, in which experiences remain distinct and orderly and furnish vivid, accurate and complete images when they are recalled, and which at the same time possesses in a marked degree the power of rearranging the facts of knowledge and experience and organizing them into groups of *like kinds* upon which the reasoning powers can be brought to bear, possesses in its mental movement the two kinds of association in a mutually helpful relation.

In order to make clear how the two kinds of association constantly intermingle in the course of thought, I shall draw further upon personal experiences. The reader himself can supply instances that will suit his purposes better than any examples that can be drawn from the mental experiences of others. Such processes are going on in everybody's mind all the time.

Whenever I hear or see the word porcupine I immediately think of one or another of several experiences. But when one has once returned to memory, I am likely

after dwelling upon it a little, to pass to the next, until all the important porcupine experiences of my life have been recalled.

The sight or the sound of the word is utterly *unlike* the animal it stands for. The only reason why the word recalls the animal is because that particular word and that particular animal have always been associated by contiguity. When one recurs to the mind it brings back the other, because they have been in mind together before. The word always calls up some individual porcupine, and usually the first to respond is the big female that my younger brothers and I smoked out of a hollow tree in the river bottoms of our native haunts one bright, cold, winter morning. As soon as I think of this animal the whole flood of details returns. Each item takes its place where it belongs; but no two of them are *alike*. Memory brings back the bits of nibbled bark on the snow at the bases of the neighboring trees, by means of which we located the animal. Then comes the hollow tree itself; the failure of our last match and our final success at making a fire by shooting a gun into a carefully heaped pile of dry leaves and whittled shavings; the patience required to nurse the sparks into a flame; our cold hands; the slowness of the smoking process because there was no hole above to allow a draft to pass up the tree; the tantalizing way in which the porcupine frequently backed down near the opening to get a whiff of fresh air; the final successful struggle; our careful dissection of the animal after we got home; and the derisive remarks that our sis-

ters have hurled at us these many years since then. These items never fail to come back together. But up to this point the association has been entirely one of contiguity. No one of the details is like any of the rest.

But once reminded of porcupines, I often stay on the porcupine trail. Association by similarity brings back another porcupine: a scene in which I saw a young brute dash a bucket of scalding water on the poor beast as it ran for its life, and heard its horrible, long-drawn squawk of anguish. Every detail of this scene comes back, controlled by the law of contiguity. Then the law of association by similarity carries me on to a pest of porcupines.

Way back in the "woods," where farms were new and few, men were building a dam and a saw-mill on a little stream. I was teaching school, and often walked three miles after school for the pleasure of seeing another set of faces and watching the men work. The woods were full of porcupines, and they had an overmastering passion for the handles of tools—axes, picks, spades—and often gnawed them nearly in two at the places where the soiled and sweaty hands of men had rubbed, and left a taste that those prickly wanderers could not forego. Having a desire to help rid the neighborhood of the pest, I always cut a walking stick of hazel or water-beech and often despatched three or four porcupines on a single trip. In the cases of some of these experiences I can after all these years, recall the minutest details—how the animals curled up for self-defense and even the little sticks and brush and logs that lay around. When the

"memory" of these things ceases to be interesting the law of similarity brings back another porcupine—one that I never saw. Our dog had had an injudicious fight with him one night and brought home both his jaws full of quills. His gaping mouth, our midnight labors to relieve him, and his almost human moans are all kept together by the law of contiguity.

Similarity again brings back porcupines—this time imaginary ones; the porcupine trail of my thought usually ends in my early childhood at a time when I had never yet seen a porcupine but had heard and imagined much about the animal. There was an unoccupied farm near a place where we often went for raspberries. Some friends a little older and much wiser than myself firmly believed and taught me to believe that on the farther edge of that field the porcupines sat in the black and blasted trees and threw their quills with their tails at passers-by many rods away on the road. The farm, the road, the distant trees, which I never ventured to approach, the imagined shape and size of the animals, the very thoughts and feelings about that, my childhood bugaboo, come back in a vivid train. The mighty power of association by contiguity brings back the items in great sheaves, just as they were bound together in the original experience.

At this point the porcupine trail ends in the trees, and the law of similarity, taking another tack, tows my thoughts along to the *other vagaries* of my childhood. There is thus in our common, unguided thought a con-

stant succession of associations, some sort of similarity carrying the thought *across* the tracks of experience from one to another that is like it; and the bond of contiguity calling up details to fill out the picture of each experience.

Association of ideas by contiguity not only makes memory and an intellectual life possible; it tends to make us its slaves. If we were to change our terms a little we would find ourselves again discussing the subject of habit. Not only are things recalled in the groupings in which they originally occurred, but usually in the very same order. This is especially true of things that have been frequently recalled in a given order. The sight or sound of the letter *a* recalls *b*, and *b* recalls *c*. But *c* never spontaneously arouses thought of *b;* and the bond of association is not from *b* to *a*. It is hardy possible to realize how vastly important this tendency of mind is. Without it there would be inevitable mental chaos. Attention is elsewhere called to the fact that the letters of the alphabet can be arranged in so many different ways that a hundred million men working steadily for a hundred million years, and writing each forty sheets a day and on each sheet forty different arrangements, would not at the end of that time have exhausted all the possible arrangements.

Now it is possible to imagine a condition of mind in which experience could not be recalled in the original order. But mental chaos would be the result. There would be no stability of knowledge and mental progress would be impossible. So strong is this tendency to associate things in the order in which they were first learned

or experienced that we are rarely tempted to try any other way. If the effort is made at all, we pitch upon the reverse order; we say the alphabet backwards. This is the next easiest thing because the letters retain their same relative positions. There are other, more sensible arrangements of the alphabet than the one we all have learned, but the scientific superiority of such an arrangement is of no help to us unless we have learned to associate the letters in the new order.

What is true of the alphabet is true of the multiplication table. Each item recalls the next in the order in which they were first learned. The same is true of the declension of a noun or the conjugation of a verb. If anything is thought of, it only recalls the part that immediately followed it in the original arrangement.

How does the mind "find" a fact that it has "lost"? By hunting for it among the facts that were known to be its original associates. If an umbrella is left somewhere on a shopping tour the owner seeks first of all to recall to mind the last place where he is sure he had it. At every stopping place, by diligent search the umbrella can be made to re-appear among its associates. Its presence there is connected with everything that was done at that point. By and by a place is reached where the umbrella no longer forms a part of the recalled experience. Now vigorous attention to details will soon reveal the place where it disappeared. So small a matter as opening the door with the umbrella hand will show that it was gone when that place was reached.

What is true of a lost umbrella is true of any fact that we seek to recall. We call up all the facts with which it was associated, and they, by their combined influence, bring back the fact that is sought. It will return almost involuntarily as a member of a *group*, whereas a sheer effort to *remember* it might be forever in vain.

Sometimes when in my boyhood, the herd had been started homeward on the trail, I would find a heifer missing, and would worry over her absence. A long and anxious search was usually in vain. After some experience I learned that it was perfectly safe to leave such a heifer to her own wits, as long as I took care of her associates. Usually within five minutes she would gallop into the herd and "bathe herself in their companionship." Her life could not be lived apart from them. And so of facts. No matter what sort of fact it may be, its old associates will drag it along with them. If they are all called in and kept before the thought it will soon be found among them.

CHAPTER XII.

ASSOCIATION ACCORDING TO SIMILARITY.

The power to reproduce the items of our knowledge and experience in the order in which they were first met cannot be over-rated. But no matter how powerfully a mind may be gifted in this respect, it will always remain a commonplace, prosaic, encyclopedic mind, unless it is likewise gifted with the power of association by similarity. While the former reproduces experience, the latter rearranges knowledge in the order of reason, the order in which the higher activities of the intellect can be brought to play upon it.

The poetic mind, that speaks in figures of speech, that makes those noiseless, ineffable allusions and the mighty sweeps of thought and feeling that make our spirits quiver in the reading, owes its power to the gift of association by similarity. Sooner or later every thinking mind must organize its knowledge by bringing together the things that are alike, and habitually thinking of them together. When we begin to think in similars it becomes possible to extract general truths from the jumble of facts.

No two things are exactly alike in all respects. When the mind associates things together on the basis

of similarity, it selects only one or a few of the qualities of each object for comparison. In the rhyme beginning

"Twinkle, twinkle, little star,"

the association of the star and the diamond in the simile is based on the single quality of brightness. When a poetic author describes the mist and says that the young beech wept tears for its mother that fell in the storm, the likeness on which the figure of speech is based is only that of the trickling and dropping water. But an association like this is powerful by its suggestiveness. The association, though based on a single quality, when it is once made, opens the way to personification and a transfer of all the other human qualities usually associated with tears—darkness and death and woe—to the weeping tree.

All human thought and speech are permeated by the principle of association by similarity. We constantly think and speak of things that are like the particular thing we are dealing with. We cannot even say of a smiling baby that it has a rosy complexion, or of a fool that his conduct was asinine, or of a quarrel that there was a heated discussion, without making use of the principle. Not only adjectives but nouns owe their suggestiveness and usefulness to this kind of association. The indescribable and mysterious power of speech of poetic men, that quality of words which seems to open up dim and distant vistas of thought without giving expression to it, is due in great part to intangible associations by similarity. The dull associations of our com-

monplace minds carry with them nothing of that unexpressed suggestiveness.

In more prosy matters, in history and science, we do not go so far afield in making comparisons, but even here the ablest minds possess a subtle power of penetration, insight that is akin to the poet's power, and is based on the ability to recognize resemblances between things that are far apart or seem very unlike. It is this subtle power of suggestion, which the principle of association according to similarities possesses, that makes the thought of some men so rich and fruitful.

But what has all this to do with the student's business of acquisition? Everything. To my thinking, the student's most critical experience with any piece of knowledge is his first contact with it. What he does with it then determines forever its usefulness to him. If he takes the time to understand a fact thoroughly, and deliberately seeks to associate it at once with as many other related facts as possible, if it is made a part of a well-knit, valuable group of similar facts, it will forever be his faithful servant. Memory will find it no burden, because it is associated with its like, attention will hover over it, interest will cling to it for the sake of its associations. It will yield itself readily to the uses of reason, because, by being associated with related facts, it is in a position to corroborate the truth they have to tell.

Of course, this all looks well on paper; but it takes time, and a great deal of it, to deal thus deliberately with every new fact. It requires reflection, comparison, the

exercise of all the intellectual powers upon each new fact as it comes up. It is a time-killing process. Time can be saved temporarily by merely memorizing the fact off hand without reflection, and without trying to get its bearings.

Near a railway station at which a narrow-gauge and a broad-gauge road cross and run parallel for some distance, I always took a lively interest in the race out of the station between the light narrow-gauge engine with its train of dainty cars and the more ponderous engine with its heavy broad-gauge load. Invariably the little engine crept ahead and soon was away in the lead, puffing defiance at its cumbersome rival. But the laws of physics were on the side of the broad-gauge engine. It lost in speed at first because it was gathering up momentum. Its loss was only apparent. Rod by rod it gained again and fairly rushed past the other train, leaving its spitting and coughing little rival hopelessly behind. Size and weight—its temporary handicap—constituted its permanent superiority after the lapse of the first few minutes.

There are also a narrow-gauge and a broad-gauge way of coming in contact with and disposing of knowledge for future use. The constant temptation is to seek present effects and be content with them. But the time spent on each fact as it comes up gives permanent momentum to it. When once the momentum of carefully wrought-out knowledge is brought to bear on further acquisition, it simply overwhelms the more usual, time-serving

method. I believe that the failure of the student to form the habit of associating every new fact carefully with others to which it is related is the most serious drawback to intellectual progress. And I believe that he is an intellectual master who has once learned to seek the full significance and all the bearings of each new fact on the spot, and binds it up with its proper associates, so that it will forever after reappear in its right place, and reveal each time its proper message. He has entered within the inner veil of learning and intellectual power. The student who does not at least seek to develop this habit had better leave his studies and go to chasing the butterflies and bees for fun.

CHAPTER XIII.

ASSOCIATION: SOME PRACTICAL APPLICATIONS.

It was pointed out in a previous chapter that words are associated with the objects for which they stand by the principle of contiguity. As a rule, the word and the object have nothing in common. The word *ox* recalls the hollow-horned, cloven-hoofed, cud-chewing beast, because it has always been associated with these qualities, not because it is like any or all of them. Words are the symbols used to represent things that are not present. Their function is to recall to mind the objects themselves.

Among all the associations which the intellect is called upon to form, the most commonplace and most important is the association between words and the ideas and objects for which those words stand. Our whole intellectual life is based on this system of symbols. If a word, whenever it is seen or heard, calls up vividly the object for which it stands—if there is a real association between the word and the object—the individual's thought will be vivid and substantial.

Now a man of very poor imagination or thinking powers is often also a man of few words; and a man of great intellectual power is likely to have command of a

large vocabulary, or, if his words are few, he is likely to be a master in their use. But it is not true that a man with a large vocabulary is necessarily a profound or vivid thinker. Training in the use of words alone does not improve the quality of one's thinking. Vitality of thought depends on the vitality of association between words and the things they stand for, or whether, when a word is seen or heard or thought about, it will actually recall the object.

A great deal has been said about our modern wordy education; we multiply words and in doing so actually flush out of our minds what knowledge and power is already there. We tend to deal with words as we do with algebraic symbols—we combine and separate them in their grammatical relations with hardly a thought of what those words are standing for. This tendency to deal with the symbol and neglect, in our thinking, the thing for which the symbol stands, is largely due to the fact that we have words for very many things which we have never seen or experienced at all. With the great modern increase of books and periodicals this tendency threatens to become chronic.

If one has actually heard or seen or felt something and then gets a word to serve as the symbol of it, the association between the word and the thing it stands for is likely to be very close. If the quantity of our actual experience can be made to keep some sort of pace with the growth of our vocabulary, there will be less danger of the failure to associate word and thing. So much of our

knowledge comes to us at second hand that many of us become mere traders in words. We think only words; and the things themselves, but poorly represented by confused imagery, tend to drop entirely out of consideration.

A little attention to the symbols of arithmetic and algebra will make the subject plainer. Francis Galton tells of a South African native who would give one sheep for two plugs of tobacco, but would not give two sheep for four plugs. He had a very practical interest in real things, but mathematical symbols were missing, so he could not carry his thought beyond the first simple step. A farmer who has five horses worth one hundred dollars apiece is likely to make full use of arithmetic. He has learned that $5 \times 100 = 500$ under all circumstances; it is always true for him, no matter whether he is dealing with sheep or horses or pebbles on a beach. But his interest is likely to be always practical. He is not likely to content himself with the thought that $5 \times 100 = 500$. For him the symbols of arithmetic will have horses and dollars as their material associates.

But if, instead of being a farmer, one is merely studying arithmetic, real objects are no longer an important consideration. 5 and 100 may stand for any objects whatever; the relations between the quantities become the chief consideration. Then one begins to deal with numbers alone. Quite early in a child's study of arithmetic it ceases to think of any objects that the numbers might represent. It is a dealer in numbers and not horses.

In algebra the mathematician still further strips the process of concreteness. In the simple equation —

$$(x+y)\,(x+y) = x^2+2xy+y^2$$

x and y not only do not represent material objects, they do not even represent any particular numbers. They teach nothing about horses or sheep or numbers. They are symbols pure and simple, stripped of all connection with real things. In algebra the interest does not lie in the objects that a and b, x and y might represent; it is the *relation between quantities* that is the subject of study. The fact that the sum of two quantities (whatever they may be) multiplied by itself equals the sum of the squares of those two quantities plus twice the product of the first by the second, is what is intended to be taught. Neither the x nor the y, nor their various combinations call up an image, because they are not symbols of anything in particular. Here we have a whole science which deals with mere symbols that have no association with real objects or ideas. The symbols are purposely stripped of all specific meaning, and when once the mind has begun to lay stress on the relations of increase, decrease and equality, it readily drops all thought of any real things for which the symbols might stand. It is this readiness of the mind to lose the association between a word and the thing it stands for, and to deal with the word by itself, treating it as an indefinite symbol which awakens no clear image, that makes a "wordy" education such a common and such a valueless thing.

Just as soon as words are combined into sentences the mind has grammatical relations among words to deal with, as in algebra it deals with quantitative relations. Now if the association between the words and the things they stand for is hazy and precarious, it is likely to be lost sight of altogether. The mind dwells on the grammatical relations and the words serve merely as indefinite symbols, like x and y. In this mental state one can read a whole page and when he reaches the bottom not know anything. This is, in short, accepting words as a substitute for a real knowledge of things.

It is hardly fair to call this an intellectual crime, for crime is supposed to be an act contrary to the general practice of the community in which the act is done. When a whole community indulges in conduct so coarse that it is indefensible from our standpoint, and lacks certain powers and qualifications, we do not call it a community of criminals. We only say it is at a low stage of civilization. By the same token, the defect that has been discussed is not an intellectual crime, for it is the common failing of reading communities. Words are multiplied and the growth of real knowledge and intellectual power come crawling slowly after. It is the easiest thing to do at any given time, and the worst of all the habits that the student can fall into.

There is only one antidote for this constant menace to real culture, perpetual care that real things shall be the objects of thought. To one who has ever tasted an orange, the word has permanent, pleasant associations,

they seem to become a part of it, so that the word itself almost seems to be pleasant. One experience with a skunk will make the name forever odious. It could never thereafter be used as a symbol for pleasant objects of thought. In these cases, the association of word with the object it stands for is extremely close.

But when we pass to the higher realms of thought and feeling, and speak of *elegance* and *grandeur*, many people who are perfectly familiar with the words cannot call up any definite ideas for which the words stand. They are merely indefinite symbols. What does *grandeur* mean to one who has never seen anything but the commonplace? Slight and superficial contact with facts and a large vocabulary produce a mental condition in which even the few real objects of experience can play no effective part in thought. To a man who has had a wide experience, *grandeur* calls up the chaotic bulk and beauty of a mountain range, the irresistible storm at sea, or the stately charm of a mighty temple. Only he who has seen and heard and felt things like those he reads about can keep a close association between words and things; because he has vivid and appropriate images stored away that are called up when the words are used. As soon as a student loses his contact with facts, his education becomes a jugglery with empty symbols.

While there is a great and fundamental difficulty in keeping up a vital association between words and the ideas they represent in studying in one's native tongue,

this difficulty is many fold greater in the study of a foreign language. Let us begin with an actual case.

An English-speaking student, in reading half a page of German, twice met the word *Eisen* (iron), once near the top of the page and again near the end of the passage. He had "studied the lesson," but when he met the word at the top of the page he had forgotten its meaning and had to be told. Now merely being told a thing is the poorest way to learn it. So he immediately forgot again. When he met the word a second time, and did not know it, his attention was called to the same word at the top of the page. He remembered then that he had seen it, but could not recall its meaning. This seems like an extreme case. But he was capable of doing good work as a student; and his case was very common, and illustrates a natural tendency.

What was the matter? He failed to develop any kind of association for the word *Eisen*, when he first met it, and consequently it was a stranger to him every time he saw it. Let us see what even a student of elementary German could have done with the word, if he had been willing to make the student's sacrifice. By close attention to the context in which the word first occurred he could have associated its meaning with all the rest of the words that formed its surroundings. He might be unable to tell what it meant the next time he met it, but by reverting to its first occurrence, he would have recalled its meaning without fail. This is a very common way of remembering things.

A better way would have been to establish, by mental effort, a strong association between the German word *Eisen* and the English word *iron.* This could have been done in either of two ways: first, by the principle of contiguity, bringing the two words together and thinking of them together until one would recall the other; second, by the principle of similarity, making note of their resemblances and differences. In this latter method we fall upon an example of how much easier it is to remember things in groups, how much easier it is to remember each fact as a member of a class than it is to remember it without such associations.

By working upon the principle of similarity the student could instantaneously have made note of the fact that the German word has the letter *s* where the English word has *r,* and that the two words are otherwise alike in sound. That is to say, they are alike, with a difference. This alone ought to make the word recall its proper English meaning in any connection. But that particular *difference* might be a troublesome little item to remember. Now if, instead of being content with what he could see at a glance, the student had had enough of the scholar's instinct to pursue the matter at all, he would have learned that the troublesome little difference, an *s* for an *r,* is itself an example of a whole class of like occurrences, that it illustrates the tendency to rhotacism, to change an *s* into an *r* in the Indo-European languages. Not only would it have been remembered forever that *Eisen* means *iron;* the strange relation of the two words

to each other would have opened up a whole new field of associations. The mind would thenceforth be ready to notice a rhotacism wherever it occurred. *Was* and *were, lose* and *forlorn* in English, *Eisen* and *iron, Hase* and *hare,* in German to English; *genus* and *genera* in Latin, would sooner or later all fall into the new group of facts. Not only is a word more easily remembered thus; that is the way a scholar is made. Instead of having one paltry association by contiguity with the English word, the German word becomes the type of a whole class, the example of a linguistic tendency.

It takes time and mental power to work this way. The sooner the fact is recognized and acted upon the better. There is no other right way. It is easier to brace up a rotten fence-post than it is to set a new one. But there is not much difference, aside from cuffs and collar, between a slovenly farmer and a slovenly student.

There is another and still better way to deal with the word *Eisen,* and that is to form a strong mental association between the word and the substance for which it stands. I have known little German children, who learned to speak English well in six weeks. Their vocabulary, at the end of that time, was not large, but the associations between words and the objects for which they stand was perfectly correct. They might have studied English out of books for two years and still be very uncertain about the meanings of their words. Their success and their certainty were due to the fact that they did not try to associate the new English words with the

old, familiar German words. They saw the objects first and then heard English words for them. They associated the new English words directly with the old, familiar *things*.

The reason why the great majority of able German, Greek and Latin scholars are utterly unable to speak the languages of which they are in all other respects such perfect masters, is because they associate the foreign words first with the words of their native tongue, and then the object itself is thought about in English. If they would do as the little immigrants did, associate the foreign words directly with the things for which they stand, *aqua* with the liquid itself instead of the word *water*, they would talk the new language readily too.

It is not easy at first to understand how much more readily words are remembered and how much more effectively they can be handled, if all their possible associations are fully under control. It may seem as if the discussion were running to a fine point now instead of dealing with large and important questions of scholarship. But what has been said lies at the very foundation of good thinking. Any one can readily test the matter in a simple way by copying a long quotation. In reading half of a sentence or long clause and then breaking off to copy, the words convey no meaning; they are only an arbitrary succession of symbols, and are very hard to remember even till they can be written down. But if one reads the clause or sentence to a finish, so that the *thought* expressed in the words is grasped by the

mind, the words are held in place by their association. One can remember more of them and remember them longer.

Items that are in any way related help each other to be remembered. Thus, "Man is made for action" can be fairly well remembered. But "Man is made for action, and not for subtle reasoning," has much more than double the power over the memory, for the two opposing thoughts constantly re-enforce each other. It is like standing on two legs instead of one. They re-enforce even by opposing each other.

One of the chief tasks of the active mind is to arrange things in such a way that the associations between them will be strong and helpful. The usual arrangement of things is not always the most helpful one. Ordinarily, learning the names of the letters of the German alphabet is a confusing and uninteresting task. Many students never succeed completely. The differences between the names of the same letters in the two languages seem to be haphazard. But if those differences are grouped into *similarities*, they can all be learned correctly and permanently in a few minutes. Thus: English *bē*, *cē*, *dē*, *ē*, *gē*, *pē*, *tē*, become, in German, *bā*, *tsā*, *dā*, *ā*, *gā*, *pā*, *tā*; and can be learned almost in a trice, if the mind will only look for the similarities and *see for itself* that wherever the English has a final long *ē*, the sound becomes in German a final long *ā* (as pronounced in English). Wherever English has initial short *ĕ*, *ĕf*, *ĕl*, *ĕm*, *ĕn*, *ĕs*, the German has the same sound. Thus

half of the alphabet is already disposed of, and in such a way that it cannot be forgotten. The other letters can be dealt with partly in the same way and partly as anomalies. But even the latter are capable of partial association by careful comparison with the English. However imperfect such a help may be it nevertheless represents simply and clearly the principle of reducing the number of separate unrelated things to be learned by arranging them in groups and learning to work by means of the similarities on which the whole groups are based.

Even among words themselves it is possible to make such groupings, which increase enormously the power of the mind to understand their meanings and remember them. *Infer, prefer, refer, defer, confer, efferent, circumference* and all their relatives can be made *useful* members of the vocabulary if the common element (*fero*, to bear) is recognized and used in trying to understand them. This process, of course, at once involves a separate consideration of each of the Latin prefixes, *circum, con, de, e, in, pre, re.* When this is done there is already in the hands of the student a power which he cannot overestimate. *Fero, duco, mitto,* and every one of the other simple Latin words becomes the center of a whole group.

It is not always desirable to follow such a line of thought to its limit whenever it comes up; but it is eminently desirable that the mind should cultivate the habit of dealing with its knowledge in this way.

Nothing can be more disastrous to healthy intellectual progress than the desultory, inaccurate, ineffective thinking built upon facts that are thrown together in the mind without care, that are not arranged in natural groups. One may know that Washington was born in 1732 and that good potatoes can be grown on sandy soil; that red-squirrels can tell a good nut from a bad one and that Sir Galahad's strength was as the strength of ten because his heart was pure. Every one of these facts is interesting; but can these four facts be put together so that men can reason about them, and draw conclusions from them? The amount of truth that shall come into the possession of the mind depends on the way in which facts are associated with each other when they are first learned and whenever they are recalled. It is the vast consequences in the way of true and vigorous thinking and larger grasp that follow upon careful and correct association of facts with each other, that have the deepest interest for the student, and render it worth his while to make the student's sacrifice of time and mental energy to secure such mental associations.

How likely is it that the student will remember that DeGama rounded Cape of Good Hope in 1497? An independent traveller is quite likely to lose his life in the hidden crevasses of a glacier, while a group of men connected by a rope gives assurance of almost perfect safety to every member. If by accident, one should fall, it is the *rope* that brings him back. The date of DeGama's

feat is much more likely to be remembered if it is tied to the historical rope along with its associates.

Even if the fact were remembered by itself, what would be the good of it? A student of my acquaintance once crammed for an examination and actually remembered by sheer force the date of the rounding of the Cape. But when asked to explain the historical significance of the act, he failed utterly. The fact was worthless to him. How much it would have meant to his thinking power, if he had been aware that it was the successful termination of a long series of strenuous efforts to find a southeast passage to India, that it was the climax of a long drama of maritime enterprise which included incidentally the discovery of the Madeira and the Canary Islands, Cape Verde and the Coast of Guinea. If his mind could have followed the successive expeditions as each in its turn pressed farther into the unknown South, if he had been impressed with the fact that all this enterprise had been inspired by the desire to improve the commercial relations with India, he would have placed the bald and lonesome fact in its natural setting, associated it with its own context. And facts in their proper setting are as eloquent as the words in an epic; by themselves they are as dull as the same words in a dictionary. Forty tons of chain links are worth no more than any other old iron unless they are interlinked. The same is true of historical or any other facts.

Those who know most are best fitted to learn, chiefly because they have a large body of varied and well

organized knowledge with which to connect each new fact. It finds itself at home at once in a vast array of closely related facts. Associations are easily formed for it. It strikes the mind at once as an individual member of an already well-known group, as a missing link in an otherwise complete chain of facts, as the effect of a known cause, or as the cause of a known effect, or as a long sought item of knowledge that completes the information on the subject to which it belongs.

But the student does not need to know much before he begins to exercise his powers of association. To him that hath shall be given. It is to the first crude efforts that perfect skill owes its greatest debt. Deliberate choice of associations for each new fact, after careful consideration of its natural relationships, is what, in the long course of time, makes the powerful thinker and the strong, reliable memory.

CHAPTER XIV.

CLASSIFICATION.

In the last few chapters stress has been laid on the part played by the principle of the association of ideas in all our thinking; and the importance of giving it deliberate attention in the training of one's own mental powers has been duly emphasized. To make the matter more impressive, let us consider the reason why the student learns things so rapidly which the world was so long in learning. In a few weeks he can get a tolerably good outline knowledge of a subject of which whole ages of the world remained entirely ignorant.

Take as an example Grimm's law of the shifting of consonants only so far as it concerns the relation of the English and German languages. It seems perfectly easy for the student to see that where English has *th*, German has *d*, as in *this, dies; thumb, Daume; thick, dick;* that English *v* and *d* are displaced by German *b* and *t*, as in *dove, Taube; love, Liebe; shove, shieben; middle, mittel; widow, Wittwe.* In a few days the ordinary student can develop an elementary knowledge of this principle of the shifting of consonants into a powerful intellectual weapon in the pursuit of knowledge and into a means of deeper insight into the relationship of the two languages than

he could have dreamed of having before he became aware of the principle.

Why did the world have to wait until the nineteenth century for Grimm to make a scientific statement of the law that governs consonantal changes in the Indo-European languages when a common student can get a tolerably fair grasp of the subject in so short a time? There had surely been enough linguistic scholars in the world before his time, and they had done their best to be real scholars. Why was the world's penetrative power so obtuse compared with the insight of a beginner in the study of language?

The answer is easy; and the surest way for anyone to avoid intellectual self-conceit is to remember that answer carefully and all the time. In every subject that the student studies, from Grimm's law to Geology, the information is carefully classified for him in advance. *The hard work is all done.* The world was slow in doing it, but it did better than any individual ever did. After Grimm and his predecessors have dug out the facts that are scattered everywhere at random in the languages concerned; after the facts that are alike have all been placed side by side, and the general truth that they then reveal has been stated clearly, it is an easy matter to comprehend and apply the principle; and that is all the student does.

In systematic botany it is infinitely easier to classify plants with the help of the "key" than it was to make the key from a study of the plants. It required many

generations of able botanists to carry on the collection and comparison of plants before a natural classification was worked out, in which all the plants that really belonged together were put in the same groups. We would be less inclined to sneer at the stupidity of former times, if we always realized how infinitely difficult it is to understand or even be aware of the existence of any subject before the facts relating to it have been associated under the principle of similarity.

When a little child puts all its yellow flowers in one hand and its blue ones in the other, it has accomplished an act of classification. A single statement, a definition, can now be made that will cover all the flowers in each hand. The child may do no more than hold one of the bunches up to its mother and say "blue"; but it has done a complete act of classification. It has separated the unlike, put together the like, and made a statement that applys to everything that is included in one of the groups.

Every common name in the language implies classification. *Building* is a general name for a large variety of structures, but they all have the same name because they have certain qualities in common, and on those common qualities the definition of the group is based. Walls and a roof make a building. Under this broad definition, smaller groups can be made. *House* and *barn* constitute two distinct sub-groups of buildings and the definition of each is based on the *use* the building is put to. Every time an adjective is added to a common noun, a new group is made. There will be fewer objects in the group,

but there will be more facts about the group in the definition of it. *House* includes many more objects than *smoke-house*. But the definition of the latter deals with more facts. Not only must the walls and roof be mentioned, the word *smoke* introduces all the characteristic elements of that kind of a house: ham, sausage, dry punkwood that will make a smoke, the thick odor of the three combined, the dark inner walls, are all associations introduced by the word smoke, and they furnish suggestions for the larger definition.

Now, if a student has presented to him a carefully classified group of facts a little reflection will bring out the general truths. If some friendly hand lays before him the fruits and flowers of many plants to "study" and places in one group the fruits and flowers of the huckleberry, blueberry, cranberry, heath, American laurel, trailing arbutus, wintergreen, swamp pink, and Indian pipe, he can easily, if he keeps his thoughts fixed on the similarities, make a tolerably good definition of the family of heathworts, in spite of their great differences. Or if he is furnished with a badly jumbled heap of fruits and flowers, and with it, good definitions of the families to which they belong, he can, with the help of those definitions, easily sort the pile into separate families of plants.

If he is furnished with a good list of examples, thus: *dünn, dick, Daume, drei, du, dein, Donner, thin, thick, thumb, three, thou, thine, thunder*, he can be easily led to draw a general statement from the facts and make at least a beginning of the rule that gov-

erns consonantal differences between English and German. Or if he is furnished with the general statement that under certain conditions wherever initial *d* occurs in German it is represented by *th* in English, he can make the list himself; for with the general rule in his possession he can easily pick the illustrations of the rule out of any printed page, no matter how widely scattered they may be.

But that is not the way the world's knowledge grew; it is only a device to make rapid accumulation of knowledge possible for the student and prepare him for the real task.

The end sought in classification is *order*, the reduction of a vast number of *things* into a few *kinds*. But at the outset the world had neither a classified group of facts from which to draw up general truths, nor the general truths by the help of which to reduce the facts to groups. It was a clear case of not even knowing whether there was anything to know. The facts of the universe are for the most part badly mixed. If nature is at times inclined to write in a legible hand she is likely, a little later, to write something entirely different the other way across the page. Humanity is obliged to gather painfully the facts that nature has scattered and reduce them to the only order in which they can be reasoned about. But usually the facts are so widely scattered that their relationship to each other is not likely to be recognized at all. It was only after the world became profoundly impressed with the truth that all things are effects of some

cause, that all things can be grouped and described by general statements, that the human mind developed the *habit* of *studying* facts.

When a beginning has once been made, no matter how small or crude it is, progress becomes more rapid and steady until it seems as if nothing could any longer resist explanation. But somehow and from somewhere must come the suggestion that certain things belong together. Three things can be arranged in six different ways, four can be arranged in twenty-four ways; the seven days of the week can be arranged in 5040 different ways, and the twenty-four letters of the alphabet can be arranged in 620,000,000,000,000,000,000,000,000 different ways. And until that first, fateful suggestion comes to serve as a starting point, there is never likely to be anything but a hopeless jumble of facts, there is no reason for trying to arrange them in one way rather than in any other.

But while we may not be able to tell why the alphabet is arranged in the order in which we learn it and use it in vocabularies we constantly act upon a tacit universal agreement to have it so. For us this particular arrangement of the alphabet is not a matter of science but pure habit. We are all obliged to conform to this established habit; for any one who did not conform to this particular arrangement of the alphabet would lose all intellectual contact with his fellow-men. The alphabet itself could be arranged in several other ways, each of which would have a usefulness of its own. The usual arrangement teaches

us nothing at all; but its universal use is what makes it possible for us all to use the same dictionaries, in short, for us all to work in harmony.

It would seem then that one of the most worthless ways to arrange a large number of words or names would be the present alphabetical order, if it were desired to do any reasoning about the facts after they were thus arranged. Apparently the only useful purpose that the alphabetical arrangement of words and names can possibly serve is to make it easy to find any given word, or name, or fact. The value of this arrangement must not be belittled. Only a small proportion of students realize the power which good indexes of all kinds place in their hands, if they will only use them freely for the purpose of gathering together the facts. Only the small minority ever learn the real value of an index in the prosecution of their studies.

But an alphabetical arrangement of words does teach a good many things that are not considered at all when the arrangement is made. The truth is that it would probably be impossible to arrange any set of facts in any kind of orderly way without discovering afterwards that it reveals truths that were entirely unlooked for. Although we know of no good reason, apart from habit, why we should arrange the letters of the alphabet in the usual order, the matter takes an entirely different aspect when we come to group together all the words beginning with a given letter. We place closest together the words that are nearest alike in spelling, beginning with the initial

letter, and following the same principle for each letter in each word. The result is that a good many "natural groups" of words are formed and wholly incidentally the material is put in good shape to teach some general truth.

If one is sufficiently alert to look for such groups, it is easy to notice that whole pages of a dictionary are taken up with words beginning with the single prefix *in;* but that there are very few words with the prefix *in* whose stems begin with *b, l, m, p,* or *r.* A study of the words as they are grouped will reveal the fact that *in* is the original form of the prefix and that it comes from two sources, the Anglo-Saxon, and the Latin, bringing with it special meanings from each source; that before *l* the *in* becomes *il,* before *r* it becomes *ir,* and before *b, m,* and *p,* it becomes *im.* A study of these facts in turn will lead to reflection upon the assimilation of one letter to the sound of another, so that the organs of speech may have no difficulty in pronouncing them.

This example seems almost too dry and simple to mention, but it is not so dry and simple as it looks. Given a mind that is awake, every little point like this may become the origin of a whole new field of knowledge.

Suppose, on the other hand, a student is puzzled to know why *get* is pronounced with a hard *g* and *gem* with a soft *g.* It is an anomaly and a sore puzzle only until he thinks it worth while to consider the matter from a general point of view. The "reason why" of such a thing must be brought under a rule; and a rule can be drawn only from a classified list of words. The easiest

thing to do is to go to a dictionary and grasp the whole subject vigorously instead of dabbling merely with *get* and *gem*. Even in a common academic dictionary it is no task to see that the initial *g* is soft before *e* in the words of Latin origin and hard in those of Germanic origin.

Of course, it may not always be the wisest way to search out a particular piece of information. Many of the "rules" that a student could extract from an alphabetical arrangement of words were recognized and carefully written long before he was born. The point I wish to make is that any classification that is valuable in a single respect, is likely to furnish the observant mind with new and unexpected information that was wholly unanticipated when the classification was made. It requires close attention to exhaust the information that any classification of facts can suggest.

A city directory is only a convenient means of finding names and addresses. But it can teach a good many important truths about the city it represents. Certain kinds of names are characteristic of certain races of men. The number of O'Briens, O'Haras and McCartys, of Schmidt and Schneider and of Goldstein can be made to indicate roughly the proportion of Irishmen, Germans, German Jews, etc., to the whole population. A moderate amount of attention to the streets on which these people live will enable one to locate the colonies of Irishmen, Germans, Russians, on the accompanying map. In

the same way the businesss directory easily reveals the location of the wholesale district, the foundries, "newspaper row," and all the other businesses that tend to congregate in sections.

Let us suppose just as useless a classification as one could well imagine. Suppose that some one, in 1948, should arrange in alphabetical order the names of all the men in the civilized world, using the Christian name instead of the surname as the basis of classification and giving their age and nativity. Would it teach anything at all? He would probably find a considerable number of men whose names would be bunched together because their Christian names were all "George Dewey ———." He would find them all about fifty years old and all of American origin, with never a Spaniard among them. The facts would be ready for an *inference;* and it would probably be that some George Dewey had made an impression on the American world, that numerous baby boys had been named after him, and that the Spaniards felt no friendly interest in him.

But while it has been shown that any classification, even one most unlikely to be useful for scientific purposes, often reveals important and interesting truths, it must not be inferred that classification is an infallible magician's wand by means of which to bring order out of chaos at once and to discover truth. Arranging objects in any one of the numberless possible ways merely to see if that arrangement will reveal some truth is likely to be useful

only for the purpose of killing time. It has been already shown that it is impossible to group objects in all the conceivable arrangements. The motive for making a classification of any kind is usually some similarity among objects that has been spontaneously recognized. When once a few objects are recognized to be alike in any respect, this similarity furnishes the basis for the first rude attempts at classification.

Take the earliest written classification of animals—from the book of Genesis. It recognizes as groups, the birds of the air, the beasts of the field, the creeping things on the earth, and the fishes in the sea. This classification is immemorial because it is inevitable, and it will always remain a popular classification for the same reason. The first classifications of any objects will be based on the most obvious and striking characters. Birds are so very much alike and so different from all other animals that the group is bound to be recognized. Now in the popular mind the most striking character of birds is the power of flight. But as soon as a systematic effort is made to classify birds with the power of flight as the basis of arrangement, a multitude of difficulties arise. There are birds that can hardly walk or fly, but can swim well; there are others that can run but can neither swim nor fly; and bats can fly as well as birds. So that while the most obvious character may serve for ordinary purposes of classification, it may fail utterly if put to a rigid test. It will not fit some of the animals that certainly

belong in the group, and includes animals that just as certainly do not belong there.

The great importance of classification arises from the fact that a series of objects that have some one character in common are very likely to be alike also in many other respects. Common sense would immediately save its definition of birds by adding other important characters that always seem to be found in *combination*, and which together make birds what they are. It can easily make a much better definition of a bird by calling it a toothless, feathered, egg-laying biped with front limbs modified for flight. Such a definition marks a decided advance. All living birds will answer to some at least of the characters. Bats are easily shut out, and so are the lowest mammals, the egg-laying monotremes.

It appears, therefore, that a classification is likely to be natural and complete in proportion to the number and importance of the characters that can be used in framing it. But the process of reaching such perfection is painfully slow and devious. How shall it be known in advance what characters always occur together, and which are the most important? An animal's mode of locomotion may be very important for its personal purposes; but it may be only a stumbling block to one trying to classify birds accurately. The only thing that can be done is to make a classification of birds on the basis of such similarities as are readily recognized. Careful study is bound to reveal other characters associated with those already

known, for example, that a bird's aorta turns to the right, while a mammal's turns to the left.

But, as accurate knowledge slowly increases, even the best of classifications and the definitions based on them seem to break down. It was discovered during the past century that in ancient geological times there were birds with long tails and serried rows of dangerous-looking teeth. The increase of knowledge finally led to an entirely different view of birds. They are now known to be closely related to the reptiles and are placed side by side with them in the group *Sauropsida*. This group is based on the characters which birds and reptiles have in common. The two groups are distinguished from each other in a far more painstaking way than formerly.

This breaking down of old knowledge does not indicate that the method of acquiring it was wrong. It only proves once more that we constantly begin to work with the most obvious facts, and only slowly succeed in reaching a perfectly natural classification by penetrating behind the most striking appearances.

Anyone can readily recall instances of how easy it is to be deceived. No boy who ever brushed his bare legs against the stinging nettles would dream of putting those little enemies of his in the same group of plants with the elms and the hop-vine. But while they are so different in appearance, close examination shows that their flowers, fruits and leaves, in fact all the characters that are now regarded as important, prove them to be very

much alike. In some of the previous chapters it has been pointed out that careful scrutiny is necessary to a right understanding of things. The spontaneous associations that we make among things are always based on striking, easily observed facts. The power of flight is impressive, and greatly unlike the power to walk. To the casual observer a tree is very different from an herb in *appearance.* But sometimes those striking appearances are utterly deceiving to one who is seeking the real relationships of plants to one another.

There is no mechanical way in which the best character can be chosen at the outset for purposes of classification. We start, of necessity, with that which is plainest, most evident to us at the time. The first steps in any effort at classification are tolerably sure to prove themselves artificial with the later growth of knowledge. But it is only by trying on any given character, just as we try on clothes, that we can be sure that we are on the right track.

The process of classification looks easy; but even the slow progress that the world has made in the various departments of organized knowledge has taxed to the utmost the sagacity of the best-trained men. And the end is not yet. Each generation has improved somewhat the classification of plants, until now botanists feel that they have a natural arrangement; but there is still a great deal to be cleared up.

In casual thought we constantly pitch upon appear-

ances as a basis of comparison. Law may still treat the whale as a fish, but science insists that it is much more closely related to the mouse. "Common sense" would say that the nettle and some of the other common weeds are fairly close together, but science says the nettle and the elm are relatives. A novice would quite likely begin his work by using the horns of certain animals as a basis of classification, and in a little while he would discover that the character he has chosen is utterly worthless, because the presence of horns would put the male of the deer and sheep in one group and the females of the same species in another. Horns can, of course, be used as a basis of classification, but when the groups are made, they are practically worthless; they do not teach much truth.

The direction of progress in making a perfect classification of any set of objects, is toward discovering characters that will reveal the true relationships of the facts. If one such character is once secured, for example, feathers as a distinguishing character for birds, and all animals possessing that character are grouped together, it will invariably be found that other very important characters are associated with it. Feathers mean egg-layers and the presence of front wings modified for flight, and an aortic arch that turns to the right. As soon as such a correlation of different characters is well established the group must be recognized as a natural one.

When the mind once habitually associates such a group of natural characters together, it uses it as a means

of discovery. We feel sure that those things will always be found together. Every feathered creature is assumed to be an egg-layer with a right aortic arch. A good zoologist can tell from a single tooth what kind of an animal carried it around in its mouth; because a given kind of tooth is associated with certain other bodily structures and physical habits. This lends a marvelous power to our thought. It furnishes the basis for inference.

But the fancied security of a natural classification may receive a rude shock at any time. In the course of time, up from the dim past looms the bird with teeth and long tail. It would seem as if the whole classification of birds would be shattered and that confidence would be displaced by discouragement.

But instead of being a cause for despair, such apparent break-downs of old systems and old definitions, are only the beginning of broader views, deeper insight, and the opportunity for a still better expression of all the facts. The presence of teeth, a well-developed tail and other antique characters in fossil birds serves to show still more closely the connection between modern birds and reptiles than the living structures do. It is true that the ancient birds are very different from the modern but those differences all point in the same direction. They teach a great new truth; they enlarge the intellectual vision; what seems to some like nothing but a rude shock to the stability of our knowledge seems to others like a new revelation. It opens up new intellectual views, as

lifting the eyes from the ground to the horizon makes a new world for the observer. It must be remembered that classification is only a tool, that truth is the end sought; and that in the very act of overthrowing an old classification, the mind may be taking a long stride nearer the truth.

The importance of the general subject of the association of ideas and its technical expression in the process of classification cannot be sufficiently emphasized in a chapter. It will be found to be really the burden of the next chapter, on Memory, as well as most of the others. It lies at the very root of intellectual power. The mere reading of a chapter or two on the subject cannot take the place of constant attention to the process in the student's daily work. It is not merely dealing with facts, but the way in which he deals with them, that is the test of the student's training. This process of association and classification of facts by means of which truth is brought to the surface cannot be too closely attended to, or too assiduously cultivated.

CHAPTER XV.

MEMORY.

Of all the intellectual powers, memory is most susceptible to the treatment of quacks, and has suffered most from devices for its improvement. The wonder about memory is, not that it fails to retain so much, but that it succeeds in retaining so much of the countless thousands of mental experiences that the life passes through in the course of years.

The emphasis that has been laid upon memory in the training of the mind has not been misplaced. The great defects of memory cannot be minimized. But most of the devices for its improvement have led to no permanent good results, because, like quack medicines, they deal mostly with the symptoms and fail entirely to touch the constitutional traits to which the defects are due. The flaws of memory are no worse than the flaws of reasoning. Most of our common, unstudied reasoning is false. But we remain for the most part blissfully unaware of its fatal defects. We make mistakes but do not realize them immediately. There is no shock, because the effect of our false reasoning is delayed. We make mistakes and avoid them next time. But when memory fails on a particular

point it is a simple, striking fact. We realize the effect of the failure fully because we realize it immediately.

There is probably no direct cure for the defects of memory. Just as a good physician, in treating many wasting diseases, finds it necessary to let the symptoms take care of themselves while he carefully builds up the general physical constitution in order to develop power to resist and throw off disease; so in the treatment of memory, the real question is not merely one of sheer clinging to facts after they have been once secured, but it is a question of the way in which the knowledge is first presented to the mind.

The careless human mind is engrossed only with the present; it has neither far-reaching mental vision into the future nor apparently any certain means of penetrating again the rapidly growing twilight of the past. The spirit of civilization might be defined as the inspiration to gaze steadily into the future and provide for it. It is only with the growth of civilization that steady anticipation takes the place of prophecy. And all this peering into the future with more or less success is the outcome of remembering past experiences and using them as a basis for our judgments.

Neither forward-looking nor backward-looking by itself is of any substantial value. The mind that is constantly looking into and picturing the future without testing those images of the fancy by the images of the memory is sure to be a mind littered with day-dreams. The

thinking has no effect upon and no relation to the passing life. Vain imaginings, beatific visions, the wild hopefulness aroused by the uncontrolled mental imagery are always shattered by the dull thuds of cold experience.

The mind that spends its time and energy recalling the past likewise leaves the practical life unguided. The present life is apparently only an uninteresting by-play of the outer world; it is moved along and buffeted by circumstances; while the mind broods upon the past and bewails the fact that it is only a memory. It draws neither inspiration nor lessons from it, but merely *dwells* upon it.

The competent mind, the mind that helps to mold and control the individual's present existence, foresees the probable events of the future and provides for them. And it draws upon experience—memory—for the materials upon which to base its judgments and its acts. It taxes what is known in order to enable it to forecast what is yet unknown. It is perhaps safe to say that one of the principal reasons why so very small a proportion of human minds are in any sense competent to deal with new problems, new conditions, hitherto unexperienced circumstances, is because the vast majority of men fail to use the past in trying to understand the future, fail to make what is already known explain the unknown that is under immediate consideration.

Every teacher daily wears away the force of his life trying to make his pupils understand the problem under

consideration by means of what they have learned before. It is because students do not remember and apply to the new case, what was learned about a former one, that progress is so slow, that every new step has to be taken as if it were one into utter darkness. Students are constantly making translations from foreign languages into English which have no meaning, which are only jumbles of ill-fitting words; and all because they treat every phrase and clause and sentence as absolutely independent of what stands all around it. It is the past, what is known, that furnishes the only possible explanation of the future, of the unknown. It is the context that gives its vital meaning to every word in a sentence, to every sentence in a paragraph. The student who "hangs to the story," who *remembers* every step that has been taken, in order to make it help explain what is coming—or if he has forgotten it, goes back to recall it for that purpose—can always tell when his translation is correct, and never feels satisfied until it is. What he already knows makes him feel sharply any error and realize keenly the satisfaction of having harmonized each clause and sentence and phase of thought with what has gone before.

Now, the student wants memory to hold fast the facts for future effect; not to brood upon and mumble over when the teeth have begun to chatter and the power of thought is failing. With this thought uppermost, let us consider the question of memory a little more in detail.

There are memory-freaks that possess almost super-

human powers. But they are so unusual that they have no interest for the present discussion. There is no doubt that under the general head of memory are included several quite distinct ways in which men seek to retain experiences that they have once had. But in a brief discussion like this I shall attempt to call attention to only a few important features of the matter which have a direct bearing on the student's voluntary effort to remember.

Let us take from Hiawatha the passage which describes the young Indian's first hunting trip and make note of the different ways in which it can be treated in the effort to learn it. Noble passages of poetry, dates and names in history, the details of any body of knowledge slip away in spite of strenuous efforts to recall them. If once the method of remembering is fairly considered, the problem of forgetting will take care of itself.

As Hiawatha walked, his little forest friends besought him not to shoot them;

"But he heeded not nor heard them,
For his thoughts were with the red deer;
On their tracks his eyes were fastened,
Leading downward to the river,
To the ford across the river,
And as one in slumber walked he.
Hidden in the alder bushes,
There he waited till the deer came,
Till he saw two antlers lifted,

Saw two eyes look from the thicket,
Saw two nostrils point to windward,
And a deer came down the pathway,
Flecked with leafy light and shadow."

The most common way of dealing with this passage, in an effort to commit it to memory, would be to handle it as a mere succession of words. They would be learned so that when one word is remembered or spoken, it recalls the next following word, and so on through the whole passage. There is very commonly nothing but a mere association of words with each other in a certain order. Both children and older people habitually, when they make a voluntary effort to commit a thing to memory, learn and remember it in this way. Each word calls up the next; and if one word is forgotten, or worse still, if several are forgotten, the memory has entirely lost its hold. The only chain of association is broken, and there is but little hope of recovering it at all.

This is pure memorizing, lip memorizing, by sheer force of will and endless repetition. It is what makes the routine work of so many studies the grinding curse of childhood, and it is the common method of older students who have never learned the art of thinking. It is this kind of learning, significantly designated by the expression "committing to memory," that lends itself so readily to quack treatment.

But it is just as well to raise the question at once, whether this kind of verbal memory can be trained at all.

There is an urgent feeling that the power of remembering is improved by much "committing to memory." It has been often urged that if a regular practice is made of memorizing passages of poetry and oratory, important historical and other facts, the memory is improved by the process. But that is very doubtful. Of course, the poetry and the facts will be useful. The more one learns thoroughly, the more he will remember in later life. But that is not improving the power of remembering; it is only loading more things into the memory to carry along. It is very doubtful whether ten years of steady effort at mere verbal memorizing would make the memory any more powerful to deal with new facts.

One may commit to memory the year 1732 as the date of Washington's birth. By sheer force of will it can be attended to so often and so long that it will never be forgotten. In the course of time such a bit of information becomes a free lance of the memory. It comes back readily, and as it were, at its own sweet will. It is so well "learned" that it often breaks in upon the thought when it has no business there; when the mind is more properly occupied with other things. But no amount of that kind of memory work is likely to improve one's ability to deal with new facts.

A change does take place in the course of time, so that the memory, with practice, does become more powerful; but the change is not due to the mere force of much memorizing. Even the most bungling kind of practice

makes the performer more skillful. But the increasing skill is not due to the continuation of the bungling. Improvement in power of any kind almost invariably means a *change of method* in the way the thing is done. In learning to hoe potatoes, improvement actually means applying less muscular effort instead of more. Perfect skill merely means the elimination of unnecessary effort and perfect adaptation of every movement to the work to be done. The most skillful workman is never the hardest worker; he comes out at the end of the day not only with the most and neatest work done, but with the least backache. Skill is the substitution of reason in place of brute force.

What actually takes place when there is any real improvement in the power to remember, is a radical change in the method of first acquiring new information. If once the mind, instead of merely trying to make certain words hang together in a certain order, concentrates its energy strongly on the successive acts of the little Indian and the deer, a powerful weapon is added to the memory. If a vivid mental pantomime accompanies the effort to learn the words, if the learner clearly pictures to himself the successive movements of the two, feels in a measure what the boy felt, appreciates the significance of the acts of the deer, has a strong sense that all these successive acts are parts of a play that is moving rapidly toward a climax sought by the boy and feared by the deer, the whole method of learning has been changed. The association is

no longer a mere association of words with one another in a certain order; but of choice and powerful words with a vivid mental picture. When memory is called upon to bring back the passage, it will begin at once to play on these images of the little drama; and they are likely to return in their original order because each act in the drama is felt to be the natural antecedent of the next one. The words are made vivid by association with the vivid images, and are readily recalled because of this association.

When once the mind dwells strongly and persistently on the thoughts expressed, those lines of Hiawatha become a pleasure instead of a burden. When the thought is the burden of the mind and the words are only means for its expression, whole lines might be lost at first in reciting; but the thought can be picked up again, and then the words come back almost of their own accord.

This method is no cure-all; it does not provide against carelessness or guarantee perfection. In fact, it is possible to repeat the "substance" of the passage and do no injustice to the poetic imagery, and still not repeat the words accurately at all. Mistakes in quoting are no more justifiable under this method of learning than under any other; but perhaps the temptation to neglect perfection in repeating the words *exactly* is increased by the fact that the "substance of the story" can be so readily reproduced. Argument about the matter is out of place. Slovenliness in quoting poetry or repeating facts can never

be justified by one who has his own intellectual welfare at heart. The best method of training the memory must include training in accuracy as well as facility.

The true training of memory consists, not in loading it down, but in keeping it unloaded and increasing its power to recall. And the surest way to recall any item of knowledge is by means of the associations which have been formed between it and other facts.

Little children suffer much in learning the multiplication table. Some of that suffering is unavoidable, for no alleviation can be offered on the score of interest or pleasure or beauty. What part of the table is it that the child learns quickly and surely? Learning the fives is always a relief, because there is a simple rule to remember the succession by. In the list of answers there is first a five and then a cipher, constantly repeated. The answers have something in common; they fall under a simple general rule. I have known a little boy to learn the nines in five minutes, after it was pointed out to him that at each step the tens in the answer increased by one and the units figure decreased by one.

I say he "learned" the nines in five minutes. He could not at once give any answer at random, without thinking; that only came after longer familiarity with the table. But he was never lost; he had within himself the power to reproduce the table of the nines and find the answer wanted. He might have to do some thinking before

he could say that 7x9=63; but he always said it after a little consideration. There was a superb confidence in the way in which he would set out upon the task of *finding* what he wanted. With constant use, he began to remember each product by itself, without the help of the rule; and now he probably never stops to think of it. But the great value of the simple little rule in first learning the nines, lay in the fact that by means of it, all the facts were at once brought permanently into the jurisdiction of the memory, and in such a way that they could not escape. If they were forgotten, they could be reproduced.

What is true of the multiplication table is true of the declension of nouns and of the conjugation of verbs in a foreign language, or of any other subject, in any field of the intellectual life upon which thought can be spent. It is temporarily easier to learn a conjugation by rote than to learn the few general rules by means of which the whole conjugation can be built up. The latter process requires much more strenuous thought. In building up a conjugation from rules, a good many things have to be thought about at every step. It is taxing; it requires mental effort. In memorizing things by rote, real thinking is reduced to a minimum. But it is at this critical point that so many students commit intellectual folly; they choose the method that is temporarily easier, at a sacrifice of permanent power. He who tries to learn to swim by straddling a slab will always be a water-fool. He never feels a sense of personal power.

So with the student. If he is forever trying to remember things by the way he saw them printed, he is helpless and a hopeless slave. But when once he grasps vigorously the general principles, he has discovered his intellectual self. The spirit of mastery has come over him. It is ever afterward in his power to reproduce any item of knowledge that he needs or wishes. Laws and principles are few; separate facts are innumerable. By prompt mastery of the former, the latter are easily subdued, memory is spared and the mind made rich. The great danger of the scholar is inability to recover again what he has once learned. Rapidity and directness of recall are matters of comparatively subordinate importance; they are easily developed by constant use of the facts.

The student may as well accept the truth of the German proverb and act upon it: "Aller Anfang ist schwer," Every beginning is hard. The teacher who seeks to make a student's task easy by avoiding the general principles that underlie a subject not only deceives himself; he is a public criminal. The student who shys at a strong effort to master the rule, and prefers to learn by rote, is permanently depriving himself of the pleasure that comes of wielding intellectual power.

It would be very comfortable if every loaded wagon could be started from an inclined plane. A span of young horses might give so much less trouble in the breaking if it were made easier for them to walk and pull than to

stand still. But they would be more stupid in old age than in their youth. No right start is easy; no more for the student than for a dumb beast.

CHAPTER XVI.

A GOOD MEMORY DEPENDS ON GOOD THINKING.

If what has been said in the last chapter is true, the great increase in the power of memory which often comes to a faithful student results from transferring the mental energy from the succession of mere words to the thoughts expressed by those words. The grasp of the memory depends on the mental grasp of the thought. And thought, to be cohesive, must make every fact a *part* of some greater whole, must bring it under some rule or general law. Real increase in the power to remember means an important change in the whole attitude toward facts.

It is extremely interesting to watch a good student, in any ordinary recitation, recite first what he has already prepared, and afterwards attack a passage of a foreign language which he has never studied before. Even in the best of students there is a chronic, inherent tendency to lapse from sharp and clear-cut thinking to mere remembering. In reciting what he has already prepared the tendency constantly is to repeat the translation just as it was made in the first place. There is no vigorous thinking. It is a case of mere old-fashioned verbal memory, and the result is that the student repeats all his

mistakes as well as his successes, just as he made them when he studied the lesson.

Now watch him when he assaults a passage never read before. A different mental tone is roused at sight of it. The lion in him begins to stir. The spirit of mastery comes over him. He summons all his mental forces; there are all the signs of mental labor. He is thinking hard. The translation is crude enough, but there is a vigor and freshness about the mental movement, an atmosphere of energy about it that is charming, after the listless machine-like process of repeating a prepared lesson.

It is when the student ceases to think and only tries to "remember," that he falls into the rut of verbal memory. If the same student, always assuming that he is a good one, after preparing a lesson, uses all the knowledge he already has of it in order to *understand it again* instead of merely trying to remember it, he will penetrate deeper into the meaning of the passage every time he goes over it. Such a mental attitude is inspiring; only it is slow in coming to birth, and in constant danger of being stifled by verbal memorizing. From whatever point of view the matter is approached, the question of improving the power to remember invariably leads to the answer that the only real solution lies in better, clearer, more vigorous thinking.

The famous and often-quoted case of Thurlow Weed may as well be pressed once more into service. He was a

great New York editor and politician; and his calling made him feel very keenly the defects of his memory. He could not remember the faces and names of the many men he met; the happenings of the moment did not make a lasting impression on him. He could not recall things which were important to him afterwards.

He finally resolved to review, at the end of each day, the happenings of that day, and so accustom himself to recall more surely and accurately what he had seen and done. In short, he would improve his memory. He adopted the practice, which he kept up for fifty years, of telling his wife every night the history of the day's doings. And he became a marvel to himself. He could remember faces and names, could give the substance of what he had written and said and could tell what he had seen; and he could do it all easily. In his case there could be no question about the marvelous improvement in the power to remember. The secret of such a power would be worth much fine gold to most men of the world as well as to scholars both the ripe and the immature.

We are concerned with what really caused the improvement. Could Thurlow Weed remember the details of Tuesday better merely because he had exerted his memory in rehearsing to his wife the happenings of Monday? Prof. William James has doubtless given the true explanation of Weed's increased power to remember. He has pointedly remarked that the improvement of memory was really an improvement in attention and observation.

The fact that when night came he would call upon himself to relate what had happened during the day had a very stimulating effect upon his attention throughout the day. It caused his intellect to dance a lively attendance upon everything that happened *as it came along*, to perform that very important act of reflection upon everything that happened just as soon as it was over with, which removed the fatal blur from the first impression and made it forever vivid.

The systematic, abbreviated nightly review of all that happened during the day gave the final touch of permanence to that day's experience. It made the day's experience more valuable to him by the calm reflections it induced, and the opportunity it gave him of comparing and connecting the facts of that day with the rest of the best and most important experiences of his life. It was not sheer practice in recalling that wrought the change in him. It was a change of method. By habitually applying his thinking powers to the details, as they occurred, his experiences always left clear impressions, and the immediate and regular review fixed them, organized them and associated them with his general experiences.

A day's experience is comparatively safe in any man's memory, if it is treated as Weed treated the details of his life. There was no mystery about his ability to remember names and faces and all other things both long and well. It was doubtless a case of strenuous application of thinking powers which are usually more than half asleep.

The fateful influence of the first impression we receive of anything, upon our whole later attitude toward the information then acquired, has been already dwelt upon. An error in observation, inadequate comprehension, a misinterpretation at the outset, makes accuracy, clearness and stability a practical impossibility afterwards. The first impression propagates itself *with all its defects;* and plants itself so firmly that it can be removed or improved only by a violent mental wrench. It is as difficult as the eradication of a bad habit. Most of the experiences of life aside from those of daily routine, are not usually repeated; and unless they are surely and correctly fixed they are lost or valueless.

The student's task is to seek deliberately and by every available means, to make the first impression *impressive.* If he fails to do this his knowledge will have but little passing value and no future value whatever. It will be only mental litter. He cannot set up the defense of the old lady whom the minister asked on Monday what help she had gained from the sermon on Sunday. She had to admit that she did not remember anything; but she cleared herself with a figure of speech. The clothes that she had been washing no longer held any of the water, but they were clean; so she had forgotten what was said, but she was better for what she had heard. The student cannot afford to get only the passing temporary effect of study and lose the facts immediately so that he can never recover them.

There are two ways in which one may seek to grasp a subject or the task of a day. A novel, to be an artistic success, must proceed by steady progress toward a climax, and yet the elements of uncertainty must be great enough to keep the reader's interest keyed up. The zest of life itself comes largely from the fact that we can plan for it only in part. It would be barren of its best influence if the future could be fully foreseen or if it were utterly beyond our ken. It is the delightful uncertainty tempered with perpetual hope that makes life what it is and keeps us active. In our reading and in our other pleasurable activities we are like the little bear in the story: "We like to be made nervous." If this were the student's chief aim he would do well to seek only the temporary impression for the sake of the feeling it produces.

But his aim is solid, permanent acquisition. To return to the novel, what the student wants is to grasp it as a plot, a structure, and a work of art. He wants to see what relation each part bears to the whole. He wants to "see the wheels go 'round." To this end he would do well to read the end of the story first. Then he would have the result of all the sentiment and passion and agony and what not in mind as he reads each detail. He would then be able to read everything in the light of the final outcome, and judge of the relative value and see the relation of each part to the whole. This method would largely eliminate feeling from the task, but it would give a much stronger mental grasp of the whole and of each part at a single reading.

It has been said of Sir Henry Maine, the author of Ancient Law, that he could tear the heart out of a book at a single reading. It was also true of him that his thought was clear and his memory good. At bottom the two powers are really one. The power to retain in memory the contents of a book, depends entirely on the power to grasp its contents when it is read. The masterful reader has a masterful memory.

It is interesting to watch the development of mental power in a good student. He may not be conscious of what is taking place within him; he may only come to feel, in the course of time, that he has become a master in the art of learning. But the process involves a complete change of front towards the facts that he tries to learn. Instead of dwelling upon and trying to remember each detail separately as it comes up, each paragraph as he reads it, each word and clause as he translates it, without reference to what has gone before or what is coming after, he learns in time to grasp the subject as a whole. His mind searches for and clings to the general truth, to the underlying principle, and tries to understand each detail in its relation to the whole. The increased vitality of his memory is due to this powerful habit of grappling at the earliest possible moment with the whole of the subject, and *thinking about it* as a whole while he deals with the details.

Every powerful scholar, whose memory is true to him, possesses this power of seizing at once upon the es-

sence of what is read or heard or seen; and by means of this clear and sweeping mental grasp he is able to cling successfully to a vast body of details that would otherwise make no impression and be utterly lost. Of course, this power comes very slowly—like everything else that is worth having—its soil is long study and broad training.

A student does not need to be a philosopher to start with, in order to acquire this power. He only needs to avail himself of what he has. If he is dissecting the pneumo-gastric nerve of a cat he can cut and pick and peer a whole day and be no wiser when he quits than when he began; and he can forget immediately everything he has done. But if he traces the nerve to the medulla oblongata and then to its extremities in lungs and stomach and heart and all the time keeps thinking about the parts that are *connected by it*, his knowledge of the nerve when he gets through, will be organized into a system.

The right way to approach any subject or any day's lesson or any fact is to prepare the mind for its reception by a review of what has gone before and is already known. The student who does not think over yesterday's work before he begins that of to-day, who does not think over his dissection of the nervous system of the bird that he has studied, before he begins to dissect the nerves of the rabbit which he has not studied, fails to make use of the "flying start." He fails to prepare himself to understand what is coming. An honest review places the mind in a state of expectant attention.

The next step is to forecast as far as possible what is to be expected when the advance is made. If the subject is a translation, the best thing that can be done to increase both speed and accuracy, is to read the whole passage at sight without help of grammar or dictionary. This preliminary struggle to understand what is new has a double effect. It puts to the severest possible test what the student already knows; and even though only an occasional word or clause is understood, it gives invaluable help in understanding the drift of the work when it comes to be more laboriously done. Even the most ignorant road-builder knows enough to blaze the trees through the woods before he begins the slower work of clearing. By doing so he gives himself *direction*.

When the same plan is followed in study, the intellect is thoroughly awakened to the problem; and it acts much more vigorously in assaulting it. The few gleams of light that penetrate the dense unknown put the mind not only in a waking but a working state. This first independent reading becomes by practice more valuable because it becomes more thorough and satisfactory. With the known thoroughly reviewed and the unknown given a good preliminary survey, the new task becomes interesting because the elements for its successful solution are present. The past is thoroughly understood, the nature of the task ahead is in a measure comprehended and the mind itself is in a high state of activity.

What is true of language study is true of mathe-

matics or history, or of the more practical-looking problems of the laboratory or of the great and difficult problems of the thoroughly trained, original, scientific investigator. The student who does not and cannot get a forecast of what he is studying, who does not at the earliest moment get hold of the controlling thought of his subject, may not be an idler, but is an aimless worker.

What has all this to do with memory? What is thoroughly understood in the getting and is carefully thought over afterwards will be remembered. Memory will hold safely what is committed to her in baskets woven of the tough fibres of thought.

Of course there is difficulty connected with the method of study suggested above. The temptation to which man most readily yields is the temptation to present convenience; and thinking is another name for strenuous endeavor. Effort to secure something apparently distant is the rock that wrecks the ambitions of all humanity, except that of the thousandth man. But the general who did not plan his campaign could not meet successfully the manœuvres of his enemy. The business man who did not draw on his experience to form his judgments about the future, and did not forecast the future before entering it with business risks, would be doomed to feed on the thistles of disappointment. The student who does not bring up all he knows to bear upon the problem that is ahead and does not seek to get some understanding of the nature of what is to come, is whipped before he

begins. He may recite a lesson, he may pass an examination, he may get a diploma, but he is not developing intellectual power.

One phase of this subject has been several times mentioned but has not been fully developed. In order to transform anything that is thoroughly understood into a permanent acquisition that can be readily reproduced in all its original completeness whenever it is wanted, afterthought is absolutely necessary. Children and most grown people are not given to reflective afterthought. The experiences of the moment pass by and are never purposely recalled. What is read leaves only a vanishing impression. All things seem to be obliterated by what follows next.

Each passing thought, whether it is only casual or the result of careful study, has a more or less marked temporary effect. But the everlasting changes that go on in thought wipe out what has gone before; and generally the fading process is rapid. Details go first, and then the larger outlines, until nothing is left except the remembrance that something has been forgotten.

The student's only safety lies in re-consideration of each subject at the earliest possible moment. Afterthought, to be effective in fixing things permanently in the mind, must be performed while even the details are yet fresh and have not yet suffered from the perpetual flow of thought. The truth of this statement needs no corroboration. It lies at the door of everyone's experience.

The student to be sure, whose time is yet divided among several subjects, who hurries from one topic to the consideration of another several times each day, is almost compelled to drop a subject entirely as soon as it is presented to him. This, coupled with the normal reluctance to do a thing until it can no longer be avoided deprives most students of a habit which would strengthen tenfold their hold upon what they have learned. It was the immediate and deliberate review that made Thurlow Weed alert during the day, and gave the regular opportunity for afterthought which always distinguishes knowledge thus dealt with from the common passing experiences that are not promptly and purposely recalled. This prompt afterthought, while the details are yet fresh, is the salvation of knowledge.

Most students, at the conclusion of a period of work or recitation, close their books and intellects, too, upon the subject that has been dealt with. Notebooks are trusted to retain what has been heard. In the laboratory, the mind utterly lets go of the subject as soon as the hands let go of the tools. There is not the slightest effort at reflection upon what has been done, until preparation for the next sitting becomes absolutely compulsory. But what is the comparative value of thinking over and expanding the notes on a lecture or reviewing a lesson, if so long a time has elapsed that all the details and perhaps even the chief bearings of the subject have become hazy or been lost? One would be considered foolish for allow-

ing a cucumber to rot before pickling it, because its goodness consists in its freshness. But we do not call ourselves or allow others to call us anything for neglecting to fix the new facts while they still have vitality. We carry so large a part of our knowledge under our arms instead of under our scalps because the notebooks save us from the apparent necessity of immediate review and afterthought. We think that what is written is preserved.

The notorious ineffectiveness of cramming, so far as real intellectual training is concerned, is due to the fact that there is a large amount of absorption without steady afterthought. There is no time left to fix facts by review. Cramming consists in the vigorous use of what some one has aptly called minute-hand memory.

Nothing that passes into the human mind is exempt from the fading process. The most soul-stirring thoughts and the most startling experiences become dim in time, and even if they are not forgotten, grow more and more ghostlike. Only those things are permanently well remembered which float in the great current of daily thought. If a subject is constantly dwelt upon by the mind, its details are always well remembered.

This leads us directly to the fact that sooner or later every worthy mind becomes dominated by one or a few great truths, one or at most a few great principles. When this condition is reached, the individual's knowledge becomes an organic system. Facts cluster around a great truth because of the bearing it has on them and which

they have on it. Not only are one's thought and studies and observations then all directed toward testing and exemplifying the one great central truth and toward the search for facts which relate directly to it; but the casual products of experience, all that is incidentally read, heard or observed, is made to contribute toward and is brought into some sort of connection with the dominating central truth. Something of value is extracted from nearly all apparently useless scraps of information and is absorbed into the growing structure of thought. Under these conditions facts are readily recalled, because they are forever eddying somewhere in the great and steady current of thought. Such a great idea, dominating one's thinking, acts like a magnet; it picks up and makes valuable facts and bits of truth which otherwise would be passed without notice.

I believe that every student in whom the leaven of the intellectual life is really working is, sooner or later in his development seized with a great truth. All his thinking powers are bent upon its unfolding. All that he has hitherto experienced or learned is brought to bear upon it in some way, all that he sees and hears and reads bears out his faith in it or in some way throws light upon it. His whole life, both past and present, clusters round it. His best powers of expression are devoted to its service, and it seems to him to be the masterpiece of his life. He may be aware of what is going on within him, and may feel that this is his real intellectual birth.

Later he may learn to his chagrin that his "new great truth" is as old as the first rosy streaks in the distant dawn of civilization, that it has always been known, and treated through the ages as a commonplace of human thought; or that it has been exploded in every new generation and its falsity made plain to all save the beginners in intellectual life. He may outgrow this first intellectual love, and even wish to forget it. But the memory of it will remain with him throughout the years of his intellectual power. It marks the beginning of his real mental life. The vigor which that first big idea roused and the latent mental power that it called into conscious activity are never lost again if the intellectual life is healthy and can find other great ideas to feed upon. Under such conditions memory produces wonders that are undreamed of in a mental life that fritters itself away upon isolated fragments of thought.

The thinking world as a whole has alternating periods of lethargy and of sublime inspiration. When it is seized by a great idea it fairly leaps into powerful, progressive thought. Before 1859, there was a long period of eddies and cross-currents. But when Darwin hurled the principle of Natural Selection into the world of thought, the lion was aroused. Earth never saw so great intellectual enthusiasm, such great progress in so short a time. The world's thought about every serious subject has been more or less re-shaped by its influence. And the world's memory awoke. Old and half-forgotten facts and whole

systems of neglected knowledge whirled into place as part of the great system. New, almost undreamed of fields were explored effectively. The world mind is becoming more and more judicial toward this great, upheaving thought. The first fright and the first enthusiasm have gone. But the world's thinking will never again be like what it was before the principle of Natural Selection was dropped into it. The world's memory of its old facts has become permanently vivid because they have taken on a new significance, they have been worked into an intellectual pattern.

Darwin himself was an illustrious example of the truth that this chapter has sought to bring out. Nearly his whole life was devoted to the development and proof of one great principle, and to tracing its consequences. Everything he met in the way of information was brought to bear upon his theory. He searched books and sought information from living men and labored incessantly on original investigations, all for one purpose. He brought all nature and the intellectual labors of all men of all times under tribute to his one great thought. Will any fact of value be lost to such a man? He will doubtless forget many things, many more perhaps than most other people ever learn. Things are not remembered merely for the sake of remembering. But the reproductive memory brings back the facts again when the mind returns to the great subject upon which it has spent the vigor of its youth and young maturity. And when the facts come

back, they return in natural groups because they were welded at the outset into a great chain of thought. What is true of the memory of a great thinker must sooner or later become true of the memory of the humblest successful student. The cultivated memory leans for its strength upon general truths to which all its separate facts cling.

It is possible for any one, under any circumstances, to remember a few things well by constantly recalling them, even though they have no vital connection in thought with other things. But one of the chief desirable results of a good education is the formation of systems of thought, getting possession of a great truth or principle and regarding all facts in the light of it. This habit results in a vast and lasting power to recall all facts in their rational relations. Under the sway of thought memory becomes both voluminous and accurate.

CHAPTER XVII.

REASONING: ILLUSTRATIONS.

It has been truly said that any fool can reason. The poorest specimen of unskilled workman, incompetent from lack of sense and a breaker of tools from awkwardness, can associate the twelve-o'clock dinner-horn with "quitting time and something to eat." There is in this case neither dullness of perception nor want of will.

But a horse can do just as severe intellectual work as this. One fall I drove five horses to a gang plow on a prairie farm in Dakota. We went our weary rounds all day without much sign of intelligence on anybody's part. We usually reached the far end of the farm on our last round about sundown. As a rule there was little intellectual stimulus in the ashy blue sky and brown prairie, but when the sun wedged itself between the two on the horizon there was beauty in Dakota. When we reached the end of the furrow and the plowshares rose out of the earth, even the tired horses stood still and lifted their heavy heads to gaze at the western sky. Perhaps no poetic fancy flashed through their brains; even the driver made short work of fancy then. But when the team turned homeward and started down the last furrow the horse-mind began to make associations.

One of the horses was an iron gray, the biggest horse and the biggest dunce in the team. He did not know enough to "stand over" when any one was feeding him; did not know enough to keep his feet off the driver's in the stall. But amazing intelligence appeared at sundown. No sooner did he feel the tightening bit that meant "turn into the furrow" than it dawned on him that the stable, with rest and food, was half a mile away.

On that turn he always led the way with a semi-miraculous action of his long legs and clumsy feet. He almost pulled the other four horses and the plow and driver half a mile at greater speed than I could worry out of him under the lash at any other time of day. He always reached the stable in a wringing sweat. The great gray beast looms up before me now, at the end of fifteen years; the quality of his intelligence was so impressive that even now, whenever I think of him, I brace myself in imagination against the side of the stall in physical argument with the brute that had "reasoning power" enough to recognize quitting time, but could not bide his time about getting home.

Much of the reasoning that we do is of the same nature as that done by the stupid laborer when he hears the dinner-horn, and by the stupid horse. In such cases, several things occur together so often that they become closely associated in memory. Apparently there is little more involved here than association by contiguity, which mental power men and beasts no doubt possess in common.

The kind of reasoning displayed here is adapted to the dead and dreary routine of any kind of life that knows no change but that of endless repetition. In these conditions it is effective, and enough to secure the practical comfort of man and beast. There is no mental strain in such a mental performance, nor any spiritual exuberance either. The joy is a low-grade, physical one.

It is the reasoning of routine, but not of emergency. The horn might blow near the noon hour because the fat in the pan had caught fire and the house was burning; or the driver might conclude to make one more round in the gloaming in order to finish a "land." Such occasional accidents severely jar the comfortable mental combination. But subsequent regularity with which certain things always occur together and the strong force of habit immediately restore the mental equanimity.

But if the "accidental variations" become so numerous as to make the habitual associations uncertain, man and beast may both lose hold of the real connections between things. Instinct and the force of habit reduce enormously the tax upon our reasoning powers because they take absolute control of all the routine elements of our lives, and make them steadily and monotonously repeat themselves. But what a crisis comes when a sudden and unannounced change of the common circumstances arises, what ridiculous situations habit then

creates,—before attention has been attracted and reason has had opportunity to reconsider the general situation! It is when such accidental variations become common that a higher type of reasoning is required. The higher life is not merely one of routine, but of emergencies also, of new combinations leading to new results. It is the power to anticipate and provide for these that marks the higher levels of human reasoning.

A few illustrations will help to make clear the increasing complexity of problems that the mind has to deal with. If a dog should lie down near his master while the latter digs a hole in the ground, even the dog would connect his master's presence in the hole with the dirt that flies out at measured intervals. If he should afterwards happen upon the hole in his master's absence he would probably not say to himself, "Ah! a hole; this pile of dirt came out of it; this is the work of man." A dog may be able to generalize in this fashion but we have no proof that he would do so. But it would be very dog-like for him to mount the heap of dirt, cock his head and ears, and look into the hole for his master. The hole and the dirt suggest his master because his master is associated with those things in the dog's experience. The next time he sees two of the elements in the combination—the hole and the dirt—he looks for the third, his master.

If a man should see a hole with a pile of dirt beside it, he would infer that someone had been digging

there, and would feel very certain about it. If he should see dirt suddenly flying out of the hole he would infer at once that a man was there and at work. Flying dirt would be the "proof." It is an effect, and the usual agent, a man, is assumed without hesitation as the cause. The observer might peer into the hole; but it is not likely that he would do it for the purpose of convincing himself that a man was there. He knows that well enough already. If he looks in, it will probably be merely to find out what man it is, and why the work is being done.

The inference that a man is working below is based on frequent previous observations of the same combination. Man, hole, flying dirt, have all been seen before. It is always probable—practically certain—that combinations observed before, will hold true again; when part of the facts are observed the rest are inferred. The certainty is due to the observer's previous experience of the same kind of thing.

When we come to deal with cases, however, in which there has been no previous direct observation, the problem is no longer so simple and direct; and what is worse, the mind may not recognize that there is any problem at all. Suppose, for example, a great cliff of hard, flinty quartzite like that on the shore of Devil's Lake, Wisconsin, with a big talus of broken rock sloping away at its base. Now I will venture the assertion that very many men and women, not necessarily stupid, have seen

them both, and have thought of the former as being very high, and of the latter as extending to the water; but without ever thinking of cliff and talus together and their connection with each other; and much less have they come, by seeing these, to do any general thinking about cliffs and the inevitable talus of rock and soil at their base. The mere fact that two things are close together gives no assurance that the mind will work out any connection between them. There stands the cliff and there lies the talus, dead, inert, staring facts.

But if any untutored man of fairly good intellect were asked, "Why is the talus there?" if, in other words, he were startled by the *suggestion of a connection* between them, the chances are that he would give a correct answer, that the pieces had broken and fallen from the face of the cliff, and had heaped up in a sloping mass at its foot. He would look, and then he would see above him, pieces large and small, loose or nearly so, and he might then even stand in expectation of seeing one fall. Everything would be full of suggestion to him, and the relation of the talus to the cliff would be perfectly plain, although he might never have seen the combination before. But the directness with which he reaches the conclusion, and its apparent certainty are based upon lifelong previous experience. Observations that have left no tangible record in the memory, the bricks and mortar of unremembered experience form the road-bed of his *way of thinking.* He may not recall at all that

he has seen thousands of things fall, as wood from a corded heap, or sand on a steep incline; none of these things may be remembered when he looks at the talus, but all of these experiences, unwittingly to him, have been built into the foundation of his thinking. They form the basis of "common sense" by means of which he reaches his conclusions.

For us the chief interest of the above examples lies in the fact that nearly all men would attend spontaneously to dirt flying from a hole in the ground, because the process goes on before their eyes. All they need to do is to look; it is no tax on the brain. But probably comparatively few who have seen that cliff and talus have ever thought at all about the relation of the one to the other. Everything is at perfect rest as if things had been thus since the morning of creation; and the mind remains a blank. A singing mosquito can always get a hearing; but the vast and silent witnesses of nature are the last to get attention. They have no bills to puncture us with; we have no special organ—no higher sense—that lets in the mighty truths. They come but slowly by the devious and much obstructed paths of mental effort.

But even in this problem of the cliff and its talus, the elements are simple and close at hand. When time enough has been allowed the rest is easy thinking. Reasoning on the subject is likely to be right reasoning. But suppose the case of a rock concerning which nothing is

known nor can be directly inferred—the time when it came, the place that it came from, and the way in which it came—time, space and the necessary force all a mystery.

There is a big black rock—"Lone Rock"—a thing of many tons that lies partly exposed and no one knows how deeply imbedded high up on the shrubby bank of a mountain stream in a little canyon in California, with no other rock like it in the neighborhood. The loose rocks in the creek and on the banks are easily accounted for; they came from the neighboring cliffs. It certainly is not native in the place where it lies; it is a stranger, and a puzzle. Such a phenomenon is strange enough to attract some attention. And it is around this kind of problem that the human mind delights to play in the lurid and ineffective lightning flashes of opinion and theory.

We are all much more prone than we like to admit, to use explanations that are second hand. It is inevitable that we should undertake to explain the unknown by the known. Now we all have faith in a rock's ability to fall. And the only explanation that I ever heard from either man or boy about the presence of Lone Rock in that place was that it was a meteorite: it had fallen there.

The explanation had the virtue of slight plausibility. Meteorites do fall. None who gave the explanation were handicapped by any actual knowledge of meteorites. In

fact, a rock that had fallen out of the universe into a creek bed would naturally be black. Those who undertook to explain its presence knew nothing about the rocks any distance from that neighborhood; and anyway, rocks like that would not move horizontally; so it must have fallen. But I had seen in museums meteorites that had actually fallen; was badly contaminated with geological doctrines and the notion that things in this world are less prone to fall into place than they are to be carried or pushed into place; and had in my life seen other blue-black rock not unlike this particular one. In short, having on hand a considerable stock of troublesome information and theory, I rejected the meteorite doctrine and believed that Lone Rock was of the "earth, earthy."

Its getting there was a prehistoric fact and could not be proved by witnesses. But I had in mind a theory of *how* it got there, and a large, indefinite feeling of the distant *when*. My little boy and I had given ourselves a roving commission to have fun and find out things in that general neighborhood during two summer months, and I thought it might help him intellectually if he helped me to solve the problem of Lone Rock. It might be possible to determine *whence* it came. Men are hung for things that no one ever saw them do; so we might be able to tell whence this rock was borne.

We began by making a big assumption—that it came down stream. This bald assumption gave us no mental

discomfort, it had no competitors. It seemed to be the only possible one. To his mind it was the natural thing to assume, and the theory that I had framed required it. One day we left camp, several miles above the Rock, and traveled over the hills to the upper reaches of the wild and tortuous stream-bed. There was no wild and tortuous *stream*, only occasional pools. I mention this fact to show how much we used our faith to complete our "knowledge," how much we inferred about things that we never saw, that were only suggested by circumstantial evidence. Still, we *knew* it was the bed of a stream, though we had never seen running water in its upper reaches.

We had not gone far down the bed, when we came upon a great formation of blue-black rock, cut through by the rushing stream that we never saw, and reaching back under the hills. Along the sides of the stream gigantic blocks of it, broken loose from the solid formation, but only a little out of place and scarcely water-worn, lay ready, as it were, to be carried off by some mighty force. As we passed out from between these great blocks of blue-black rock, there passed into our minds the "certainty" that we had found the native seat of Lone Rock. Just below the down-stream edge of the formation, we still found large boulders of it, a little more water and weather-worn.

Even the little boy could believe that such large rocks could be pushed somehow so short a distance; in

fact, he could see that they *must have been*, because there was the big formation from which they came, and there they lay, down hill from home. He knew something about the demi-gods of Greece and their ability to move things, but we had carefully excluded them from consideration. He had rolled some quite heavy rocks down hill himself, but had never seen at work any force capable of moving such as these. With the help of a few suggestions about floods of water and frozen jams of ice and logs and trees he began to conceive of natural powers great enough to move big rocks; and in a little while he was as wild a speculator and as active a geologist as any one, young or old, that I ever saw. When once his mind had taken the first short step of moving a big rock a little way down hill, he realized that more of the same kind of push in the same direction would account for Lone Rock several miles below.

Now all that has been said about Lone Rock sounds like what it really is: the philosophy of an eleven year old boy. He moved swiftly and with a fair degree of certainty toward a great geological theory and the solution of a hard problem for which most men and boys gave an explanation without investigation.

But not even the first step could have been taken without the friendly push of suggestion. With this help, judiciously and sparingly given, he was aggressive enough in looking for facts and making explanations.

It was *after* he had grasped the general doctrine of

ice and water action that he became a really active and interested observer. When he understood, in a measure, the cause, he could see a multitude of effects all about him, which otherwise he would never have seen at all; and he became even in the course of half a day tolerably expert in explaining what he saw, and showed especially a very striking increase in his power of observation. Having a little knowledge of the probable cause of these things gave him second-sight.

Without help he would have been helpless. But in what would I have been better off than he in the presence of the problem of Lone Rock, if I had not first had suggestions from others such as I gave him? There lay the hard and cold and homeless, friendless fact. I could probably have done no more with it than he. It is quite likely that I would not only not have inferred a reasonable explanation, but would not even have sought seriously for one. If I had never heard of the glacial period and learned something of ice and water action and of all the consequences that these involve, I would have stood before the big, black mystery as helpless as my little boy.

The most important lesson that was driven home to him that day so that it may stay with him through life, was the impression that everything that he saw about him was an *effect*, produced by some cause capable of producing it. The desire to explain things or have them explained—the mind-hunger for truth—grew apace for

half a day. His childish powers discovered themselves—things could be explained, and he could at least struggle with such problems although he blundered.

CHAPTER XVIII.

REASONING: A LARGER PROBLEM.

Let us see whether the world at large and the best minds in it have a more direct and certain way of reaching explanations than my little boy and I had. Take the same kind of problem that we tried to solve in the creek-bed.

Plowmen had picked up bits of native copper scores and even hundreds of miles south of the Lake Superior copper-bearing formations; and they inferred that Indians had dropped them where they were found. The Indians themselves had from time immemorial caught fish and gathered wild rice on the thousands of lakes of northern Wisconsin and Minnesota, without perhaps even wondering at their existence or their number. That was their world. They neither knew nor cared whether there might be fewer lakes of different character in the world or even a few hundred miles from where they lived.

The white lumbermen of the same region cut the marsh hay off the myriad swamps for winter use in the logging camps knowing and caring nothing about how the country came to be a land of swamps. The farm-

ers and especially the farmer boys of Canada and the northern part of the United States have gathered the stones on their rocky farms and have built them into long stone walls without knowing what it was that scattered them so mischievously. They thought of them only as a perennial cause of back-ache. The few that did stop to wonder how they came there were no wiser at the last than at the first. Limpid lakes with no outlet, scenery that ought to rouse thought in any man, farmer or poet or philosopher; the grooved and polished rocks, clay soils and bedded gravels, lakes and swamps and ancient beaches, both in America and Europe, sent up their mute appeal to be recognized and explained.

But the human mind, that wizard of the universe, went on in its sordid career of catching fish and raising grain and herding cattle to satisfy the stomach; or indulged in the semi-glorious task of spilling blood and compelling others to do its bidding and its labors. No man dreamed that all these things were due to one great force that had "worked over" the face of the northern earth. How *could* they imagine that things so different from each other were in any way related? It is not probable that anyone ever would have dreamed that wonderful truth if someone had not at some time and somewhere seen the cause itself at work.

If a little boy can in half a day, with the help of judicious suggestion, make such apparently large scientific strides, why did it take the intellect of Europe all

the ages until the first half of the nineteenth century to find out how the great erratic blocks of Alpine rock got across the valleys of the Rhone and Aar from the Alps to the slopes and even summits of the Jura Mountains? It is so easy to get information out of books, and to understand what we are told that we marvel at the world for being so slow in finding out big truths. With a little suggestion and guidance we can grasp a big principle and revel in its consequences even in half a day. Why should the mind of the world be so dull of penetration as not to get even a glimpse of a great truth until ages have rolled away and whole races of men have delved in and trodden upon and lived and died upon and been buried in the mute, magnificent evidence that there was a glacial period in the world's history?

The difference is all due to the fact that if one can see the cause that produces a thing at work on the spot, or has seen it produce similar results elsewhere, or has had its action explained to him so that he gets a conception of how the effects were produced, the mind has an extremely easy task to perform. Time and patience and industry will clear up all the facts. The theory of how the effects were produced throws light on every new fact that is observed. It is a lamp to the intellect; it lights things up so they can be seen and then explained. That is why it was so easy for me to investigate the origin of Lone Rock and help a little boy grasp the theory and make the explanation for himself. It was not

a stroke of genius; it was only applying a truth which others had discovered.

But if the mind has never in any way been made aware of the cause that has produced the results that are noticed, if nothing whatever is known on the subject, how can it even begin to think about them correctly? What reason could man have given himself for supposing that the distribution of the stray bits of copper, erratic rocks, boulder clays, sands and silts, the ancient fresh water beaches and the thousands of lakes and swamps of the cooler temperate zone were all effects of a single great cause?

Men did the perfectly natural thing with all these facts. They never regarded them as having any connection with one another. They gave the most reasonable explanation for each kind of fact. Plowmen thought the Indians dropped the copper. A pious or even an impious farmer might suppose that the devil had strewn the stones afield for the discipline or annoyance of mankind. The smaller facts like these would secure attention and receive each its own separate explanation. But the larger facts were not likely to be seen at all. The peculiar distribution of lakes, the peculiar soils and scenery would not even be regarded as peculiar because they are so extensive. Our vision is too limited. The biggest facts escape our notice and the whole magnificent group of facts is not recognized as a group at all. When each little fact has received an explanation of its own, it is

less likely than ever that we shall think of all the facts together as the effects of one cause.

We do not see very much of all that is to be seen. But what we do actually see and think about at all the mind makes an effort to explain, whether with the help of ice and water action or of demigods and devils. In the presence of facts that we cannot understand we are like cattle—gaze awhile and turn away. But a fact that is once explained has perennial interest for us, even though the explanation is wrong, because it wakens thought in us. It pipes its simple little tune of truth in our ears until we feel the world is full of music. The intellectual hope of the world lies in the fact that we are prone to give explanations. If we were more careful in seeking them and less ready to accept the easiest and most striking one, truth would make much more rapid progress. Now let us see how the world ever came to hit upon the glacial theory as a general explanation of all the facts that have been mentioned.

Both peasants and savants of Switzerland were acquainted with the glaciers. Their movements and their work had been given scientific attention. The problems of terminal and lateral moraines were no more difficult than that of talus and cliff described in a previous chapter. The action of water at the foot of the glacier was a matter of direct observation. The cause and the effects were there together and could be observed in close connection. The ice carried the boulders and

pushed the detritus and scored the rocks, and the water worked over and sorted and laid down the sand and pebbles.

The problem of the Alpine boulders over on the Jura Mountains was like that of Lone Rock. They were away from their native seat, with the cause of their removal gone. But they had not only gone down hill but up again on the other side of the valley. Charpentier, who had studied the alpine glaciers and their work in carrying and pushing rocks, in 1834 expressed the belief that those stray boulders on the Jura range had been carried from the Alps by glaciers which once extended across the intervening valley. This was a bold generalization. But it was only an extension of a force already known and well understood. That force was only called upon to act on a larger scale and in the same direction. Nothing new was added to the conception of a glacier except magnitude. Effects, the cause of which was absent, were explained by inferring a cause well known and producing similar effects *near by*.

And now began a scientific marvel that is still, over half a century later, unrolling itself before the eyes of a waking and wondering world. At this point Louis Agassiz, the generalizer, became interested. He expressed the belief that glaciers had not only crossed the valleys, but that ice had filled those valleys and covered the foot-hills, too, that the whole region had once been ice-bound, and that the present glaciers of the Alps are

nothing more than retreating remnants. The evidence was there to support his view. Then he went to Scotland, where he and Buckland studied half a dozen areas that revealed all the characteristic evidence of glacial action.

The magic key that unlocked this great new world of glacial geology had to be made in a glacier country. As soon as the effects of glacial action were understood, and when once it was known that those effects existed where glaciers no longer were, ah! then, having eyes, men saw the evidence that they had blindly trampled on and waddled in for ages without knowing that it existed.

Now we know that not only Switzerland and Scotland but all of northern Europe and Canada and the northern United States and our western ranges are scarred and scored and written over and over like a palimpsest with layer upon layer of unmistakable evidence of former glacial action. It was ice that covered the north temperate zone and grooved the solid rocks and scattered the boulders afield and sprinkled the bits of copper to southward and plowed out the lakes and dammed up and changed the river courses and wiped out scores of species of plants and animals and drove others out of their northern homes and left them stranded on the temperate mountain tops; that pushed up the gravelly hills and finally melted into water that made the great lake beaches where now are fields of waving grain.

No romance can be written that would be more fascinating to a thoughtful student than the marvellous history of glacial geology. In the short time since Charpentier made his suggestion a whole new science has developed. The field to be covered is so vast, and the knowledge already wrought out so comprehensive that it requires years of training to make an expert glacial geologist.

CHAPTER XIX.

REASONING: HOW THE MIND STRUGGLES AFTER A TRUTH.

The brief sketch of the glacial theory given in the last chapter shows how sound knowledge actually grows. It was chosen as an illustration because the subject is recent, its history short, its strides have been enormous, because it has explained a multitude of facts, some of which all men can see, and because the great existing glaciers of Alaska and the ice-fields of Greenland and the Antarctic continent are yielding and will yield still more important scientific knowledge by the light of which to interpret the evidence where ice no longer exists.

Before the cause was recognized, most of the facts were not recognized at all. The few that attracted attention were given, each its separate explanation. In the absence of the true cause, how could the mind conceive of any connection between things so different as parallel grooves in the solid rock, scattered bits of copper, and the stranding of cold-temperate species of plants and animals on the high mountains in the temperate regions? No amount of study of the effects would avail; it would not be known what effects belonged together. Until the cause itself could be seen at work, there could

be no hope of seeing the effects it had produced in regions where it was no longer present.

It was not only the common people who did not see and understand; the best trained scientific investigators trampled on the evidence without seeing it. Each little shred of remarkable evidence that was seen, was explained by some cause already known. When one is once on the wrong track in making explanations, they become more and more elaborate and complex, like the Ptolemaic system of astronomy, instead of more simple and straightforward. It is only when the mind is moving toward the solid ground of truth that explanations grow more and more simple and satisfactory; and the strangely different facts are all brought into beautiful harmony.

The most striking effect that the introduction of the glacial theory produced was that it enabled men to *see*. As soon as the cause was understood the scenery of the old glacial region was viewed through new eyes and interpreted. The beaches of ancient and vast fresh water lakes could be traced where before there were only unmeaning ridges; old and choked-up river courses were traced where nothing at all was seen before. Wild rice and marsh hay and fishing and duck-hunting could now be seen to be related to one another and the theory. The great mass of diverse facts becomes a web of circumstantial evidence, *as soon as the cause is understood.*

When a small boy exclaims, "Papa, I have added

three numbers together and the sum is forty; what are the numbers?" he knows that he has the easy end of the task and that his father may never be able to tell what numbers he used. Most of the problems of nature and of life are presented to us in much the same way. Nature makes the combinations and then usually wipes the slate, leaving nothing but the results. Our task is,—given the results, to find the causes; given the answers, to find the numbers that were used. Take, for example, this simple little puzzle:

"BURIED MUSICAL COMPOSERS."

"Never did I rob a china shop or steal a chop in the market, but one day, Dick, his chum, Annie, and I set out on a marauding expedition. Dick said he would lasso us, at which we laughed, but it made my heart wag nervously. Then we found Flo Marsh and Ella Ross in idle chat engaged, and calling Ella and Flo toward us, we invited them to go with us, but they declined. We berated them soundly, as Esau berated his brother, Flo sat like a cherub in injured innocence. 'Let's stop in here,' said I, 'for Harry Bell.' 'In I go,' replied Dick, but he soon returned, saying he feared he would be stung by a bee or an asp. 'Oh, ridiculous,' I cried, 'A bee, tho' venturesome, may not sting you, and anyway, it is said to bring luck.' But Dick, crying 'Ou!' nodded his head at me and said, 'Rob, Alf, Ernest, and all the rest of you, I'm going home.'"

The maker of the puzzle decided to bury a list of famous names, and wrote out a more or less sensible combination of words, among which the names are concealed. His task was direct, synthetic. Anyone able to write could do it in some fashion. He would not even have to know the names of musical composers in advance. He could pick them at random, to suit his desires, from a music book.

The task of the guesser is of an entirely different nature. The puzzle is very simple both on account of its nature and on account of the shallow way in which the names are "buried." But it requires some skill in dealing with such things and some knowledge of musical matters even to make a beginning. Without these, there is no way to start. Suppose one is not acquainted with the names involved. How can he recognize them? Under such conditions the names Beethoven, Chopin, Rossini, Wagner, and the rest could never be discovered. Nor is it an easy matter to appeal to books. Perhaps that particular combination of names could not be found in any available book outside of a biography of music. Even with the latter book, it would require very, very long study to pick out the right names both in the book and in the puzzle and bring them together.

Anyone having any knowledge of music can pick out the names readily, because Wagner and Beethoven are names that he would surely know. But we are working now under the supposition that the guesser does not

know so much as this. Let us consider the puzzle from the latter standpoint. To begin with, the whole population of the earth might read the puzzle and not recognize that it is one. Telling a person that there is a puzzle is what makes a guesser out of him. It makes him look for something. But even then he would be at an utter loss. To get him started at all it would be necessary to tell him what kind of a puzzle it is; what sort of hidden thing he must look for. If one stops to think, it is easy to see that the largest and hardest part of the work has to be done in advance in order to make even a guesser out of a person. A little reflection on so simple a thing will lead most of us to pass milder judgment on the "stupidity" of the world for not seeing and learning things faster and reasoning better.

When once the nature of the problem is understood, the mind begins to feel about for solid footing. It seeks all the time to escape from the attitude of guesser and to take up the position of a maker of the puzzle. Probably the first step will be the assumption that the names are famous. Here at the very outset appeal is made to a probable "general truth" in order to get at particular facts. In a biography of music, the famous names will have the longest biographies, so by the help of this general assumption the guesser will know in advance which names to pounce upon. The mind has already departed a long way from the position of guesser. It is trying now to be a *maker* of the puzzle.

But it will require skill and some knowledge of good English to get help from the written words. Assuming the guesser has some skill and training in English, he can see "indications." When he reads the words "my heart wag nervously," and "a bee, tho' venturesome," he will make a careful examination as surely as a cat will stalk a gopher-hole. He knows those expressions are unusual English, and will look in those connections for the names. In this fashion the puzzle is solved. The guesser at every step is making strenuous efforts to equip himself with the same knowledge that the maker of the puzzle had; then he can see what is in the puzzle.

Take a simple problem in algebra. Suppose a student is given no rule to go by, but is simply told to factor $x^2+2xy+y^2$. He must know a good deal in advance about numbers, quantities, signs and factors before he can do anything at all with this specific problem. If he knows that it is a product the facts begin to look suggestive. He knows that x^2 is x times x, and y^2 is y times y. The mind would instantly try in some way to put these factors together. In other words, the student turns himself into a multiplier, not a divider. *He has a theory and tries it.* He may make many mistakes. But he would follow the same plan with variations as if that were the fundamental law of search. Which it is. He would find at last that the factors are $(x+y)(x+y)$. But he would also find that there is no royal road to the truth. He is asked to analyze a product, and he does

it by a series of efforts at synthesis, at putting things together, at producing the product. His progress would be rapid in proportion as he could shift his position from that of analyzer to that of combiner.

Just as soon as this one problem is solved he can draw a general truth out of it. The sum of two quantities multiplied by itself, equals the sum of their squares plus twice the product of the quantities. From that moment he is a deductive philosopher. He is in possession of a general principle and he works it on every new case as savagely as if he were the worst old deductive debater of mediaeval times. This example has furnished him with a *type*. Every new problem is treated as a member of a *class* of problems under a general rule. The mind has not merely discovered a new fact. It has opened up a whole new field of investigation. Now it has the power to recognize products, can search for other cases, and treat them at once and effectively as particular cases under an established rule.

Now let us recall the glacial theory. Ages passed before men recognized that there was evidence to consider. A few remarkable things were noticed, but nobody knew what they were evidence of. Men gave to each remarkable fact a separate explanation and left the rest unobserved. The erratic rocks on the Jura Mountains were a puzzle. They came to be recognized as one, and that was a very long stride toward explanation. When a man arose who knew about the work of actual glaciers

and also knew about the erratic blocks across the great valley, and thought of the two together, then science could put itself in the position of one knowing the cause and thinking of it as still acting. Charpentier extended glacial action to regions where it was no longer at work. Agassiz made another generalization, extended the principle over vast areas. Now, with the cause known, certain things were always seen to occur in combination. They were seen because they were to be expected, if produced by such a cause. Men knew there was something to look for, knew what it was like, and were in a mood to look for it. That is why glacial geology grew apace in so short a time. The facts could be explained by the new cause and could be explained in no other way. The mind had climbed up the hill and could now slide down.

CHAPTER XX.

REASONING: ITS PROGRESS DEPENDS ON RECOGNITION OF SIMILARITIES.

The chances are all against anyone's recognizing a general truth or law at a hazard by merely looking at facts one at a time. Nor has anyone ever made much intellectual progress by gathering a miscellaneous lot of facts and then gazing at them. He might gaze thus for a century, and the larger his heap of facts became, the more confused and chaotic it would be. From somewhere and at some time must come a suggestion of some kind of connection between the new facts and facts that were known before. It does not require much of a suggestion to rouse the alert and sensitive mind into activity. If the state of expectant attention is well-developed and chronic, a hint may be enough to start one on a voyage of discovery.

A little reflection upon the illustrations used in previous chapters will make it clear that our progress in reasoning is due to the recognition of similarities between things. Direct observation upon the glaciers assured men that certain facts always occurred together. The relation of cause and effect was actually observed. Now

our minds and the universe are so constituted that we can infer the whole when we see a part. If we know that certain things always occur together, then, when we see part of the facts, we infer that the others are there or were there, even though we do not see them. The mental process amounts to this: certain things have always occurred together in our experience, and therefore they will occur grouped in that way again.

When Charpentier announced that glaciers had carried the erratic blocks over onto the Jura slopes, he was merely inferring that because part of a certain group of facts was before him, the rest must have been there at some time. We feel certain that the relation of cause and effect is constant. If we have seen both cause and effect before, and then see some or all of the effects again, we feel sure that the cause also once existed. And if we see a cause at work we are confident that the effects are there. If part of the facts are missing we confidently hunt for them. The ingrained belief that similar effects are produced by similar causes brings about the organization of our knowledge on the highest plane of reasoning. The magic principle of association binds the facts together with an unbreakable cord. Where boulder clay and copper drift are found, moraines and grooves in the rocks are likely to be, and ice must have been at some time. The mind is sure that its fundamental laws of association cannot lead it far astray.

It is this recognition of identity that makes it possi-

ble for us to reach out into the unknown and explain new facts at all. The far-reaching similarities of nature make possible our mental groupings of facts and give us intellectual mastery. The power, first of detecting similarities and then of looking for them elsewhere, underlies the power to reason. It is the basis of the simplest inferences of the child, and of the most subtle and far-reaching conclusions of the trained scientific enquirer. The difference lies in the quality and thoroughness of the process.

And this association must always be found between a fact that is already known and one that is new. It is extremely unlikely that anyone will derive much valuable knowledge merely from comparing two or more strange things entirely by guess. Step by step each new fact is assimilated with old ones already known. With the addition of new knowledge the old conceptions are modified, improved and enlarged. The theory of glacial action is very different now from what it was sixty years ago. But at every step, each new fact was interpreted with the help of the body of knowledge already on hand.

It has often been said that the Greek and Roman intellects were in all respects the equals of the modern mind. That is doubtless true. But we have the great advantage of two thousand years of accumulated knowledge. Human power depends on the tools it has to work with. Our knowledge is vastly greater and more accurate

than theirs was; and our appliances for doing work are vastly better and more numerous.

We can build only with the help of what is already known. Every new act, every uttered word is colored by what has gone before in the life. We can tell from a man's talk what his training has been; from his figures of speech where he came from and with what sort of work he has always busied himself; from the sentiments he expresses, the manner of his moral life in the past. The pupil is usually a disciple of his teacher. The son generally votes as his father voted. We think and speak and act, always with the past as a basis. We cannot cut loose from past knowledge and opinion, and we would not if we could. For it provides us with our only possible starting points of thought.

The unscholarly mind has no settled purpose concerning its facts. There is no guiding principle, no general motive in the thinking, no desire to place each fact in its right relations from the outset. But after all, as the wind unwittingly and in rude fashion separates the dead leaves and groups them in hollows and fence corners and leaves the green ones in groups on the trees, so the inborn laws of mental action tend to work over and reduce to order the chaotic knowledge that tumbles hap-hazard upon the attention of the individual. He neither seeks facts systematically nor takes care of them after they come to him. But slowly out of the chaos there grows, without his effort, a crude system of thought.

Some people have this feeling for mental order more strongly developed than others. Their minds instinctively recognize similarities without ever consciously formulating what they do. They become fairly good spellers, even though they never learned the rules of spelling. They cannot tell why it is so; but it is because they have a strong feeling for similarities. They seem to act according to general rules that they never learned nor consciously stated to themselves. Even in the unscholarly mind the laws of thought keep chaos at bay by grouping facts according to their similarities and slowly working out explanations. But it is the student's acknowledged business to attend consciously and purposely to this matter, and reduce his knowledge, so far as lies in his power, by reasoning about it as fast as he accumulates it.

A vast body of human knowledge, much of the most important that we guide our lives by, is only dimly understood or wholly unexplained. Many of the old proverbs told truths that experience had found to be so, but which were not comprehended. The connection between the tides and the moon was observed without any knowledge of gravitation. The causal relation between a lowering morning and a rainy day needed not be understood at all to make the knowledge practically effective. The modern weather bureau can give reasons and make more accurate predictions, but the value of the original observation cannot be belittled.

Such knowledge as that described above is empirical. It has value, but is unexplained. The first knowledge of each individual and the earliest and most important practical knowledge of the race was of this kind. Certain connections between facts were observed, as that fire hardens brick as well as wooden spear-points. But no attempt was made, nor is any attempt usually made even now to give a scientific explanation of the process. For practical purposes it is not necessary. The bulk of humanity lives by the light of such empirical knowledge.

Quinine has long been known to be a specific for malaria; and suffering humanity has gratefully swallowed the bitter medicine without knowing why it produces its effects. Physicians understood it no better than the burning and shivering victim. But humanity, not knowing the cause of the disease, took the medicine, went straightway and laid itself down where the infection continued its deadly work. Pitiful sight, in the light of recent science. Now what has happened? Reason, the piercing weapon of scientific investigation, has solved the mystery. Science had done what it could to study the disease after the victim was sick. Much was known about the stages of the disease and the changes in the blood that were due to the infection. Now the cause is known. Malaria is due to a parasite that passes through part of its development in man and part in certain species of mosquito. The disease is transmitted from an old to a new victim by the mosquito.

Quinine is still valuable. But the guilty mosquitos (genus *Anopheles*) exist wherever there is malaria; and now that the causal relations of the disease are understood, prevention is likely to outdo the business of curing malaria. Mosquito-breeding rain-barrels, pools of stagnant water, and swamps are receiving attention now. Systematic withdrawal at nightfall into mosquito-proof houses by itself will secure human beings against malaria in the deadly Campagna near Rome. A thin sheet of petroleum floating on a water-surface closes the breathing pores of the mosquito larvæ and kills them before they leave the water. Drainage of standing pools and swamps removes mosquitos and malaria at a single stroke.

The former scraps of empirical knowledge on the subject seem almost contemptible now. The new truth not merely adds knowledge to the old. It explains what was known and changes the whole point of view. Now the world's knowledge of malaria is rational. It understands the causal relations. Man or mosquito must conquer, because the enemy is in sight; there will be no more "shelling the woods." And the chances are all against the mosquito. Its power will be badly crippled if it cannot be destroyed. Knowledge of the subject is now of a different kind.

What has been done for malaria has been done for yellow fever. The mosquito is guilty. Hitherto, men have spent hundreds of thousands of dollars disinfecting persons and clothing and ships. They labored blindly,

because there was no rational knowledge of the disease. The facts were not explained till their cause was known. And in assailing the problem of yellow fever, science used the new knowledge about malaria. The light of one new truth leads to others like it. The bond of similarity made possible the extension of rational knowledge to a new subject.

In the progress of the individual mind, as well as in the experience of the race, empirical, unexplained knowledge, must give place to rational knowledge. The causal relations of facts to each other must be understood and expressed in general principles. This transformation of partial, accidental, but valuable knowledge into rational and thoroughly organized knowledge, goes on as long as there is mental progress in the individual or the race. When it ceases, growth is at an end. The thinker drops back to the level of the animal and the creature of habit.

It is a vital concern of the student to keep up steadily the process of reducing his knowledge to a rational state, in which all the facts are brought into their true relations with each other. The constant temptation of living things is to become parasites. Even the eagle is willing to let the hawk catch the fish and then help himself to it. The quickest and largest results with the least effort is a guide of life to which students, like all others, fall victims. Accepting information ready-made, explained, organized under principles, and applied, is fol-

lowing the lines of least resistance. Originality, the spirit of research, deciphering the hidden meaning of things, is following the lines of greatest resistance. But the two methods do not result merely in a different quantity of knowledge: the latter produces an entirely different kind.

We cannot, of course, free ourselves from the work that others have done before us, and the opinions they have held. While we profit by them abundantly, we are also in a real sense their slaves. And with so great a mass of knowledge and opinion ready-made, we are very prone to accept them without a serious review of their value. The structure of knowledge and opinion that has been reared by humanity is a mighty heritage of intellectual strength transmitted to us. But every student, to save his intellectual manhood, must hold both fact and opinion at arm's length long enough to examine it carefully and determine its value to him.

Lessing, in a hot religious debate, said more than a hundred years ago, "If God held in His right hand all truth and in his left the lone but ever active desire for truth, though coupled with the condition that I should keep forever falling into error, and should say to me, 'Choose,' I should seize his left hand and say, 'Father, give, pure truth is after all only for thee alone.'" The question with us all finally narrows itself to this: Shall we accept our opinions and facts in bulk on the authority of others, or shall we be habitual searchers after truth under the constant liability and fear of making mistakes?

The test of the student's strength is the amount of independent energy with which he throws his reasoning powers upon the problems that are presented to him. If the subject to be studied is the arterial system of a mammal, and the place is a laboratory, and the teacher says, "Catch a live cat and work out its arterial system," and then puts his feet on the table and reads the report of the latest dog-show, the student has just cause for complaint, because there is none of the preliminary suggestion without which none of us can make a start. If, on the other hand, all the preliminary work is done for the student, which is often easier for the teacher, and he is provided with a book that gives detailed directions for every step, the student will be so perfectly guided that the faint impulses to originality are smothered. If every branch of the arterial system is described, its course explained, and even what to cut and what not to cut is carefully told in detail, the net result of a day's work, even for a good student, is likely to be the summing up: "Yes, it is just as the book says." Then he "goeth his way, and straightway forgetteth."

It is initial ignorance of where to look and how to take the preliminary steps that kills progress and the desire for it. But if the student is shown how to prepare the animal without destroying the very parts he is to study, and has the aorta pointed out to him, all the rest should be within his reach. If left to himself, he would have to use his reason as well as his scalpel in finding the

branches, at every touch of the knife, at every clip of the scissors. When he had finished he might not be able to give the names of all the parts; but he would know his subject so well that if it were necessary he could give good names to them himself. Instead of forgetting what he had done, there would be an imperishable addition to his knowledge because there was lively reasoning at its birth. Work thus done is valuable because it is transfused with thought. The slavery, parasitism, intellectual degeneration is due to constant assistance. Without it, only half as much work may be done, but the results will be tenfold more valuable; and a hundredfold more intellectual power is developed if the student works out the problem with his own head as well as with his own hands. It is hard at first. But after a little the joy of working grows and there is a glow of feeling that drives the hands and the head to success. Error and failure become only incidents.

This method is difficult to apply, but its fruit is easily recognized. It alone can give the student the lasting impression that everything—every word in a sentence, every letter in a word, the shape and size and place of every pebble, every sound of nature, every shade of color in every flower's petals, every tint in the ever-changing sky—is full of significance, is a record of forces that have been and are still at work. The mind early loses its artless inquisitiveness, and falls into the dull routine of

habit, unless it is kept awake by the process of real, personal investigation.

One of the most permanent convictions imbedded in great productive minds, in all fields of learning, is this, that all things need to be explained and that sooner or later explanations can be given. Darwin and Tyndall, Faraday and Von Baer and all their kind were alive with the feeling that all the facts around them were written records, that they had a truth to tell which could be interpreted by whoever had eyes to see. Such men trained their great powers on thousands of little things which others had seen before them but had not tried to understand. This intense sensitiveness to the lisping, whispering, truth-telling and truth-concealing nature about us is a great gift, and intellectual success is measured by the degree to which it is cultivated. The senses grow keen by constant use, there is no other way of training them. And the mind grows sensitive to truth by working on it.

CHAPTER XXI.

SOME FURTHER CONDITIONS OF SOUND REASONING.

No effort has been spared to make the fact impressive that mere reasoning does not make one an intellectual success. Some very important conditions have to be considered, on which the quality of one's reasoning depends.

Nature and life are so constituted that there is certainty nowhere. We are obliged to act confidently upon probability. He who keeps himself in a state of doubt till he knows all the facts, whether in school or in business, will never do anything but sit and wait and be miserable. It is absolutely necessary to act upon partial knowledge, so there is always risk connected with every decision. But that is what constitutes the spice of life. We must place confidence in the law of our mind which says that what has been true once will be true again under similar circumstances. But we can never be sure that the circumstances are exactly similar.

Therefore as long as the human mind continues to grow in power, and its knowledge continues to grow in perfection, there must constantly be readjustment. The mind not only has to work over and organize its knowledge into consistent beliefs and opinions, but must constantly

reorganize it. Knowledge that seemed perfect and complete yesterday, will seem utterly inadequate and poor tomorrow. But this is no mark of human weakness. It is a sign of growing strength, of new and better knowledge. It is only a proof of Bagehot's profound remark that "the price of improvement is that the unimproved shall always look degraded."

Progress toward truth is very slow. It is an easy matter to draw inferences, but the law of our thought, that what is true of one thing is true of every other that is like it, is dangerous, because we are so far away from the *facts*. We have to reason so much about things we cannot actually see or investigate, that the more sweeping our inferences are the more likely they are to be wrong. There may somewhere be a break of continuity among the facts of which we are not and cannot be aware.

A little study of logic is likely to make one feel that he can reason his way straight from common ignorance to the profoundest truth.

> "Now, Huxley from one bone could make
> An unknown beast; so if I take
> This spout of water, and from thence
> Construct a whale by inference,
> A whale, I venture to assert,
> Must be an animated squirt!
> Thus, children, we the truth may sift
> By use of logic's priceless gift."

This ridiculous view of logic is not so serious an exaggeration of the facts as it may seem. We expect logic to do things for which it was never intended. It is like a fanning mill; what was not put in the hopper will not come out of the mill, no matter how hard the fans are made to blow.

I once taught geography to a young boy who did not care for geography or any other study. He was no fool; so at last, in my despair, I told him, as a test of his thinking power, that I would give him five minutes to tell me where all the large cities of Ireland were. He came back before his time was up and not only told me they were all on the coast, but told me the reason why. They formed the working joints of commerce between Ireland and the rest of the world. He felt like a master then. I gave him the United States to study, and he explained the locations of the big coast cities. With the help of a gentle hint he was able to point out the head of navigation on many of the principal rivers. But the problem of American cities after a while became so complex that he almost lost sight of his original "great truth" and had to invent a variety of explanations. The farther he went the more apparent it became to him that simple reasoning from his first discovered truth would not carry him through his task. A wide knowledge of geographical and commercial conditions was necessary to an understanding of the location of many American cities. Sagacity, the mental quality which distinguishes the wise man from

both the fool and the logical machine, is a prime requisite in reaching truth.

I have tried before to show that merely telling a thing does not make it a permanent piece of knowledge for the hearer. It is then nearly always forgotten. It must be *experienced.* One may tell a child a hundred times that a hot stove will hurt. It knows the fact, but the fact is unimpressive. It must touch the stove; then the fact is burned into its mind as well as onto its hand. Thenceforth the child can reason very accurately. "Hot stoves burn; this stove is hot; therefore it will burn," is unassailable logic. Animal safety depends on the power to avoid *repeated* accidents.

We give no special credit for ability to reason in this way. The power is common to men and animals, and it saves much misery. But the moment the facts become a little different, or slightly complicated, most men become absolutely helpless. If we could always tread on the ground of absolute certainty there would be no distinction between the wise man and the fool. But since we cannot, caution and discrimination in forming conclusions distinguish the former from the latter. The language is full of names, ill-defined but familiar, for the mental characteristic that distinguishes the two kinds of men. Judgment, sagacity, common sense, wisdom, express from different points of view and in different degrees the fact that so-called reasoning alone is about as likely to lead into error as into the truth, to accident as to safety.

All normal men and women know that a blazing lamp will set a house on fire. They reason quickly and correctly. But the vast majority of them who try to carry exploded, blazing lamps outdoors burn themselves badly and often burn themselves to death. The infinite pity of it all is that sagacity often plays no part at all on the stage of life with heroism and sacrifice for others. If, instead of running with the blazing lamps in front of them, the flames fairly licking off their clothing, they merely turned around and backed out, so that the blaze and heat would move away from them, they could accomplish all that their splendid courage inspires them to do, without suffering such fearful fatal consequences to themselves.

Faraday, the great physicist, said that the greatest weakness in scientific men is deficiency of judgment. He meant this to apply in matters in which those men should be expert. In the long run the difference between theory and practice, failure and success, unsound and sound reasoning, folly and wisdom, is due to the presence of good judgment, sagacity, in selecting the right facts to reason upon. Every step of a logical process may be absolutely correct and the conclusion be utterly false, because only part of the facts, or only the least important, have been used in making the inferences. Good judgment is the ability to weigh all the facts, give each its proper influence and draw right conclusions. What is true in this respect of scientific reasoning is true in the reasoning of common life.

One may understand a general principle perfectly, and even be familiar with many of its applications in science and practical life. But that is no guarantee that in a new or hitherto unthought-of combination of circumstances the application of the principle will be realized. A student of physics may work for weeks on the theory of the expansion of gases, prove the truth over and over that gases expand on the application of heat. But it is not at all unlikely that he will ride home from his experiments and lean his bicycle against the house in the sunniest and hottest corner. When he comes out again he finds a tire exploded.

He can quickly reach the correct conclusion about the cause; for he has a great advantage over others. His training in physics, while it played him false in the matter of foresight, has developed a quick and accurate hindsight or power of explanation. Air in the tire and heat in the corner: gas, heat, expansion, explosion. Scholarly theory and practical fact seem so far apart and yet so near. Foresight, sagacity, judgment, common sense, are apparently set at naught by such an act. A young physicist ought to know better. But he is not very different from the most of us. His training makes the new experience much more valuable to him than it would be to others. If his mind is something more than a dumping ground for facts, the experience startles him into mental activity on the subject in an entirely new field—the practical side.

In a general way it may be said that human thinking is defective chiefly from the failure to consider all the facts that apply to the case in hand. Most of our opinions of men in both their public and private relations, most of our conclusions in the fields of scholarship and practical life are faulty because, through ignorance or prejudice or indolence or carelessness we fail to take into account all the facts that ought to be considered. This curse rests heavily, not only on the masses of men, but upon well-trained men as well.

The neglect of a single condition may produce utter failure, even though all other things are carefully attended to. I once saw a boy undertake to noose a lizard with a noose made of a spear of grass. It was apparent enough by the way he went about it that he had often caught lizards before. The lizard only blinked and waited; the noose was properly made, and went easily over its head, and the loop closed around its neck. But the animal darted away almost without a struggle. The boy had used a spear of grass that was just a little too dry, in bending, it broke a little too completely at one place and held together only by the outer skin. When the lizard jumped it snapped. Failure is so characteristic of human activity because the neglect of an apparently unimportant little factor can mar the whole result of long and cautious effort.

Even when our judgments do not lead to utter failure, they may be so burdened with error as to be prac-

tically valueless for future use. There was a time when it was thought that pacing off distances was accurate enough a mode of measurement to use in determining latitude. Now the most accurate instruments, thoroughly trained observers, carefully chosen places for observation and measurement, and endless repetition of the observations are all brought to bear upon the subject, in order to eliminate, as far as possible, every source of error in the determination of latitude. What may seem to be fairly well-done and satisfactory to-day is worthless to-morrow. Results of every kind can be made permanently satisfactory only by the most careful elimination of all possible sources of error.

But the elimination of error from our thinking is no easy matter. It is not only by using more accurate instruments but by the development of infinite patience in the individual character that it becomes possible to hunt down the minor and hidden errors that vitiate human thought.

First we make mistakes on a large scale because we do not recognize the likenesses between things that look radically different. We fail to get hold of the real greatness of a truth because we fail to perceive the likenesses between the two extremes of a series of similar things. We do not *see*, we have to be *taught* that the burning of a straw-heap and the rusting of a plow-share are the same process of oxidation and that the vast apparent difference is due to the fact that the one is slower than the

other. The power to penetrate below the differences and recognize the likenesses is given only to him who is willing to serve a long apprenticeship in the search for truth.

At the other extreme is the constant danger of error due to neglect of minor differences. Charles Darwin wanted to find out once which of two sets of plants on which he was experimenting produced the more seed. Ordinarily it would seem sufficient to examine a few cases, because anything but a slight difference would be easily discovered. But he was dealing with small differences, and it was very important that there should be no mistake. So he deliberately counted twenty thousand seeds under a microscope before he regarded the question as settled. He spent a life-time doing work that way; and the reason why his work has lasted so well is because he pursued every little question until, by his merciless exhaustiveness, he had fairly proved the view that he finally held.

The ability to see facts clearly and to appreciate differences commonly neglected comes only from long practice in *looking* for them. In the course of time a keenness of mental vision, a sharpness of observation, is developed which would astonish the student who is only beginning his training.

The openings to any new line of thought are likely to be small. What many people never see at all, are pounced upon as *indications* by more observing men;

and these little whispering suggestions may lead the mind into a great new field of thought. Any untrained mind can remember, perforce, that in a certain year there was a heavy rainfall in California. The facts were great and striking. Wind and falling sheets of water were spectacular. The softened ground let go the roots and trees both big and little leaned over as in weariness. Even a stupid, garrulous crone can repeat the story in the years to come. But that rain has left a record that stupidity never reads. It not only left its record on the account books of the people, but wrote the story secretly around the heart of every tree that was growing that year.

The tongue of the untrained man is fed only by his memory. But one who has been trained to read significance into things that others do not see at all, could read the fine writing of nature in the trunks of all the trees. The broad, thick band of wood that grew that year is the record written round the heart of every tree that was alive in the forests at that time. One who saw the big rain would easily associate the rings of wood in the trunks of the Monterey pines with the rain that caused them. But even one who did not see it could surely infer the cause of the big rings that were formed in all the trees during the same year. And the succeeding rings would tell tales of lean and thirsty years. His thought once started might develop into an investigation that would lead him to the reports of the weather bureau and the account books of the hardware men who installed hun-

dreds of pumping plants in the orchards to offset the lack of rain.

With all of us, in all we undertake to do, the chances of error are enormous, and the training that results in real intellectual power must create in the mind a habit of looking for more facts and a certainty that every fact has a tale to tell. A man who depends on his intuitive ability to get at the truth at once, is untrustworthy both in scholarship and in business. To be sure, a business man of long experience gives important decisions in the morning concerning the business of the day, and it seems as if those decisions had been made after only slight consideration. But the outsider who observes this apparent spontaneity of judgment does not know how long and carefully those questions were weighed secretly during the day and night before. He does not know how to estimate the powerful effect of that business man's past experience on his present judgment. The man himself may not be aware of what it is that gives him the necessary sagacity to deal with a particular case. But the great substratum of experience mostly forgotten and buried beneath his present consciousness, furnishes the indefinable but solid basis of common sense which makes him see things promptly in their true light.

Neither do scientific men turn out great ideas spontaneously. They labor silently over their views and look for their own mistakes, and at last present to the world only the results that have been wrought over and over,

carefully and painfully, in secret. The public knows in a general way how even the best established scientific views undergo change as knowledge improves. But it would marvel, indeed, if it knew how many tentative views, how much of speculative thought, what multitudes of fancies that they had supposed were facts, scientific men quietly cast aside as their minds slowly work their way toward the truth.

The same thing is true in all things relating to the higher and finer judgments of men. There is no intuitive road to the truth. Good judgment lies at the far end of a long and up-hill road. But the well-trained mind comes after awhile to *feel* the right and the wrong at each step. There is an indefinable intellectual sense developed which brings sound judgment with it. Sagacity grows only slowly and silently in the carefully cultivated soil of experience. It does not come "by first intention."

It is by expecting that something will happen that the robin constantly saves its life. The same kind of habit of expectant attention is developed in the right-thinking mind. The life in which expectation plays no part is of no value to itself or to any one else. As the habit of anticipation grows, the mind learns not only to expect that something is coming, but to foresee more or less accurately what it will be. Experience develops the power to interpret little indications aright, whether the matter under consideration is a Latin translation or a weather prediction.

Most students who work hard have at some time struggled persistently with a subject that constantly baffled them. And perhaps when failure seemed most certain, an understanding of the subject has come as if by inspiration. A new insight into what was poorly understood seems to be the result of happy accident. But such happy accidents occur only to those who are prepared for them. The great inventions that startle the commercial world, the great scientific discoveries that revolutionize human thought, and the little mental triumphs of the student in his daily studies are all the result of long previous labor and patient searching. Though the final success, the final insight, seems so sudden and startling, so disconnected from what has gone before, it is after all, "the vexing, forward-reaching sense" coupled with sagacity that leads as if by intuition straight to the desired result.

CHAPTER XXII.

REFLECTION.

Winning a battle is not all a general has to do. Unless he promptly and carefully reaps the fruits of his victory he had better never have fought at all. Unless the student takes the time to reap the fruits of his systematic efforts by careful reflection on what he has done, his labor is largely wasted. Old Confucius came into the world late enough to be able to observe that "Learning without thought is time lost."

Telling students to muse upon their work, to think, seems much like telling men to be good. They have been told this since the beginning of the world but they are still prone to do evil as the sparks fly upward. Success that comes of effort instead of luck in any department of life depends on hard and steady thinking. Merely trying to understand or repeat the thinking that is done by others does not bring success either to a grocery clerk or a philosopher.

In dealing with any subject, either as students or as practical people of the world, the most of us are inclined to let go before the subject is "worked out." Interest in other things draws away the mind from its regular

duties before they are thoroughly done. The clerk who has his hat on and his hand on the door-knob when the clock strikes six has taken his mind completely off his duties; he need not look for promotion. He is no thinker.

If on the other hand the mind remains fixed on a topic so that results can be worked out, it still labors under humanity's handicap—an irritable desire to act directly. We cannot brook delay or postpone results long enough to give careful reflection to what we are doing. No thread of thought is spun, no garment of reflection is woven. Is it any wonder that our knowledge is so imperfect and unreliable and our notions are so far away from the truth? The robin might as well expect living nestlings without brooding on its eggs as for a human being to expect profit from storing up facts without brooding over them.

Facts without afterthought have no common purpose; they only get in each other's way. When once they are brought by reflection to point toward a common truth, their combined force is not merely the force of one fact multiplied by their number. The courage of a single wolf is a very doubtful quantity; one may have mixed feelings concerning it, and quite likely contempt for a single wolf will not be absent in the mixture. The same is true of a single fact. It may slip in and out of consciousness on wolfish, padded feet, but it commands no respect, gives no inspiration.

But seven wolves leave no doubt upon the mind. Their courage is no longer the courage of a single wolf multiplied by seven. It is the courage of the *pack* that makes it dangerous and makes men wish that there were fire between it and them. The mysterious new power of organization and mutual support has entered as a new and most important factor. Each wolf makes a different kind of wolf out of each of the other six. Every snarl and yelp gives hotter, quicker breath to all the pack, till the victim is brought to bay in terror. The facts that constitute our learning likewise draw all their interest and importance from being carefully thought over and brought into close relation with their fellows. They give each other mutual support. Each becomes a proof of the truth of the others.

It is the constant learning of more and more facts without thinking about them that produces the hopeless confusion revealed in examination papers and which is so constantly and despairingly discussed and so often made the butt of ridicule.

A class in English literature was given a series of selections from the Old Testament to study for their historical and literary value. No religious requirements were connected with the reading. The purpose was to familiarize the class with those great Old Testament characters and passages that have permeated all literature with allusions, and without a direct knowledge of which every reader of modern literature and every stu-

dent of mediaeval and modern art is at a constant and serious loss.

In the examination, one of the young men, in answer to a question concerning the historical position and character of Moses, said, "Moses was born in a manger, and found and brought up by the daughter of a shepherd; he was born in Israel and lived there till a young man."

This fearful and hopeless confusion of facts would be more laughable and less pitiful if such intellectual performances were not so desperately common. They are not oddities, but fairly represent a large part of the miscellaneous knowledge that is ordinarily accumulated even under the guidance of teachers. But the student is the culpable party. His curse is lack of thought on what he is doing at the time he does it, and reflection after the work is completed. That is what leads to all the mental confusion that crops up afterwards when the facts get hopelessly mixed. And it is not likely that they will ever be brought back into their original connections again. After the first impression is made each fact is allowed to shift for itself without further attention. Too much of the student's work is left in the stage of "first opinion"—crude, unconsidered and defective.

The student's natural excuse is that the tendency of the times so burdens him with quantity of work that it is with him a sheer question of getting over the ground, let alone cultivating it carefully by the reflective process. But a little afterthought goes a long way. In the long

run the surest way to master large quantities of work is to give careful thought to every step. Thought and afterthought become a habit by and by, and the time so often lost because of a poor understanding of a subject is all saved when once the habit of reflection is established. To be specific, ten minutes of reflection will save half an hour of digging before the day is over.

It is nearly true that reading, and repetition of what others have said—so-called study—on the one hand, and real thinking on the other hand are in inverse ratio. A really productive thinker may do much reading; but he makes his reading incidental to his thinking. When such a man reads he *reaches out* after the crucial facts. He is after the kind of information that will help settle something one way or the other. Lincoln, Bunyan, the antique Edmund Rich, were all men of small reading, as we speak of reading now; but what they read, they used to feed the furnaces of their thought.

I do not wish even to seem to belittle the value of reading. Breadth of thought and culture, soundness of reasoning, require a wide range of knowledge. It is a fact, however, that the vast and growing literature of the present is affecting the quality of our wit. We learn to read with *no intention* of giving the matter a second thought. A large supply of facts, a wide range of accurate knowledge is indispensable to sound thinking. But much reading is fatal to the development of the higher intellectual powers unless these retain the mas-

tery over all the material that is brought before the mind. Truth reveals itself only slowly, and our desire to act directly, to have a conclusion promptly, makes most of us followers of those who are willing to *wait and think*. It is important to know the truth at the beginning of life; but wisdom comes only at the end. It is only when the facts are all summed up and carefully thought over that the truth reveals itself.

The leaves of the trees unfold and fill the earth with green; they grow brilliant when bitten by the frost; they fall and are forgotten and are followed by others just as good. But the permanent part of the tree is of slower growth, silent and imperceptible. The daily tasks pursue one another through the seasons, and each seems like the other. But the power of thought grows large and abides. It upholds the fabric of knowledge because it built each item and gave it vitality. Final success, explanation, penetration, insight, may seem sudden and startling, but it is only the late fruit of steady and accurate thinking carried on silently through the years.

CHAPTER XXIII.

THE IMPULSIVE AND THE VASCILLATING WILL.

The writer may as well make a confession here that is not made in the preface. This book is written to the willing student. And by willingness I mean not merely the willingness of inclination but of active force. What will be said in this chapter, therefore, will have chiefly a negative value for him. It will deal largely with states of mind that had better be avoided. The following chapter will discuss what seems to me to be the desirable qualities of the will.

The drunkard drinks and the boy plays because impulse is the master. Present gratification is the only motive that rules the conduct. There is no regard for consequences, no consideration, no serious thought about the bearing of the present act upon the near or distant future. In such a character there is no reflection between the first thought and the action; no influence of remote interests or the interests of others upon the present conduct. Such a life of impulse is a stream over which the judgment exercises no apparent control.

A typically impulsive will acts in entire absence of reflection. It is swayed at every step by a single thought.

No deliberate judgment is first passed upon all the possible motives for action or the absence of it. Each new circumstance sways the mind completely and excites to action. The senses and passions fix upon whatever is at hand, and gratification, immediate and complete, is the only matter that enters as a motive. Every act, however, is followed by a complicated network of consequences. But the life of impulse leaves these out of consideration at every step, and is always unprepared for what is coming. Responsibility is set at naught. Such a life is one of careless drifting with the stream of interest or of cruel buffeting against the consequences of unconsidered acts. As soon as the immediate interest has been exhausted the life has to hunt for a new hold upon the world. A new start has to be made. The chief difficulty here is the lack of permanent motives to action or restraint. There being no such guide, the will is free to act without the friction of deliberate reflection, and the course of conduct as well as the course of thought is likely to be a series of errors.

There is a curious, but not uncommon, effect produced in the class-room by what has been aptly called the explosive will. From among my experiences there stands out the case of a student of French. He had studied carefully the principles of the grammar; but when it came to the reading of French, he made a bad failure of it, because there was in his character a combination of low reflective power with great explosiveness.

There was inability to gather up all the data necessary for making a right decision, inability to wait until deliberation had done its work. The translation of every sentence that he touched was a succession of errors, because he could not "keep cool" till he had considered all the facts. In one effort he might give careful attention to the tense of the verb and answer before attending to its number. In the next effort on the same sentence he might reverse the process. Only by constant criticism and check upon his explosiveness could he be finally induced to correlate his facts and squeeze the truth out of them.

His case was unique, however, because this trait was so pronounced in him. The type of mind, in a less extreme form, is quite common. At bottom, this explosiveness seems to be due to the fact that out of the cloud of facts that ought to be considered, one stands forth so clearly from the general haziness that it wields an almost unhindered influence upon the mind; and immediate action follows. The student of French referred to always did most of his thinking after he had spoken. As soon as he understood a single point in a sentence, he seemed to be under the dire necessity of giving expression to his knowledge, regardless of the other points that were entitled to equal consideration.

Great explosions come from the sudden release of tremendous force that may have been long in gathering. The action of the will may be very sudden and violent

after long, undue repression; but that is entirely different from the everlasting pop-pop-popping of the explosive will that goes off on the slightest provocation and leads to action that is not preceded by deliberation.

The other extreme is seen in individuals who habitually give long and careful consideration to any proposed line of action. One who acts without deliberation, but on the inspiration of each momentary impulse, is likely to be an "active" individual, busy all the time; but his activity is not industry because it has no ultimate ends in view. In the type now to be discussed the will is constantly checked by the spirit of deliberation. Professor James has given a fine description of the two types of mind in his Principles of Psychology; and he shows that the latter type does not necessarily imply an ineffective life. It habitually gives consideration to all the factors that can possibly enter into the question at issue; the thinking is clear, the decision is definite; the reasons for the judgment are sound. In such a type the decision so frequently is that it is not worth while to act, that it leaves the impression that the life is a negative, ineffective one. Whereas the explosive individual is constantly busy carrying his various impulses into effect, the deliberative individual seems incapable of effective action.

But this is not so. Such a character may appear defective in will power, while it may really be symmetrical. Its life is likely to be steady and quiet. It may commit errors of judgment. Its reasons for not acting

may not always appeal to the sound judgment of others, but they are easily understood. Inaction is not due to confusion of thought or inability to reach a decision. One thus gifted may act only rarely; but when he does act, he is likely to act with great force, because his mind is made up. Not uncommonly this apparent sluggishness of the will is coupled with great stubbornness of purpose when action is once taken.

Every thoughtful individual can draw from his own experience illustrations of errors of judgment. Some time after an apparently important thing has been done it becomes plain that it was not nearly so important as it looked. Acts that were omitted because their reasons appeared unimportant, sometimes look very different at the end of a day or a week. They assume an importance that is wholly unlooked for. Things that promised satisfaction turn into ashes when touched; and things that we dreaded to approach and worried much about seem to lose all their significance after a little. Time, "the great independent variable," gives a lengthening perspective to the details of our lives which robs them of the original value that we assigned to them. Some that we treated as insignificant become large with importance, and others, to which we assigned vast significance, dwindle into paltry details.

The impulsive type of mind is likely to be forever falling into this kind of error of judgment. Acting always on simple, momentary motives, it gets no mental

perspective by means of which to judge rightly of a given course of thought or action. The deliberate type is likely to see things in their true light. The deliberative individual may lose many of the legitimate passing pleasures of life, but he is not likely to lose the solid attainments which one with the explosive nature never can secure.

There is, however, a much worse condition than either of those described above, one especially fatal to the best interests of the student. He is bound by the nature of his calling to be an accurate and systematic thinker. But thought, to be of any value, must furnish effective motives for action. The thought itself will be untrue to reality unless kept running in a well-marked channel that opens out into action. The state of mind in which a consistent train of reasoning is carried through but does not result in any kind of action, can even make a fool out of a genius. Motives, if felt, are not strong enough to produce action.

I am not speaking now of the contemplative mind, which stands, as it were, by the roadside of life and makes notes upon experience, which purposely remains in the attitude of observer and commentator of the action of others. I refer to the state of mind in which the desirability of a course of action is recognized and acknowledged but there is not enough desire or will power to carry the thought into effect. Most human beings love action of some kind, and give some sort of exercise to their vital

powers. It is in the presence of difficulties that thought becomes more and more widely separated from action. The lack of moral force to carry the clearly conceived notion through into reality over obstacles tends constantly to weaken the relation between the individual's thoughts and his acts. There is no difficulty in thinking out a plan or a line of reasoning; and the stress of life is avoided by stopping short of action. Under such conditions such action as there is, results from the pressure of circumstances, while the thought becomes more and more disconnected from reality.

Even the scientific man, who is supposed to deal exclusively with hard, cold facts must have a powerful imagination to light the way for his slow and dogged thinking. But he always brings imagination to heel and makes it the servant of real investigation. It is chained to facts and must carry them along. Its flight is constantly checked and changed and hampered by tests.

When a habit of day-dreaming and shirking reality is once cultivated, is deliberately invited to govern the mental life, will power is likely to be at its lowest ebb. The most beautiful and consistent day-dreams flourish best in the absence of the healthy, robust action of the will. Speculation in science and philosophy is the easiest and wildest where the facts are fewest and most obscure, and experiment does not enter to disturb the course of thought. Theory is most complete and perfect where there is no chance or mood for practice.

To make the character flaccid and ineffective it is not necessary that the mind should dwell largely upon notions that cannot be put into execution. There is a constant temptation to let thought have its free course and to stop just short of action, even when we are thinking upon wholesome, nearby things that can be carried into effect. The difficulty seems to be in that first exercise of the will that leads to action. Legions of men and women keep their minds actively at work upon the possibilities of life, but do not take the first step required for their realization. This state of mind, once chronic, makes action pale and sickly. This flabby quality of thought that lacks the bony stiffening of the will is more common, especially among students, than most of us would be willing to admit. In the end the individual seems to lose all ability to crystallize his thought or even his desire into action. Circumstances may coerce him to act, but that is shabby training for the will.

There is one doubtful improvement on this state of things. There are multitudes who conceive clearly and reflect fairly well, and who spend much moral energy firmly resolving to accomplish certain results. Resolutions relate largely to action at a definite time in the future. They are mostly a concession to the righteousness of the thought and a provision for postponing the action. A resolution is only the shadow of the will; and shadows are mostly worthless.

Alongside this poor apology for will power belongs

the vascillating whiffle-tree will, that alternately begins and abandons action. It finds no secure backing in careful judgment. If for any reason action of any kind is begun, the reason soon appears a poor one; other reasons arise for doing otherwise. Decisions are readily reached and action may be prompt, but no sooner has performance begun than confusion arises; new considerations come up and produce hesitation that ends in a halt. Then comes further deliberation, and another start, that loses its force before the friction is overcome. The will keeps whipping back and forth like a tree-top in the wind. Chronic uncertainty finally pervades the whole life. Such an individual is in practical life marked by the community as one to be avoided when anything is to be accomplished. Not only is he no helper of others; he is a check on all straight-forward action.

CHAPTER XXIV.

THE AGONY OF STARTING.

The reason so many good ideas are never carried into practical effect is that there is a period of agony that intervenes between the thought and effective action. The beginning of any action is more difficult than its continuance. Even a horse knows that. It costs blood to start a load that is easily pulled after it is moving. But there is comfort in the thought that the law has no exceptions. Every force acts more slowly at first. Gravitation does not agonize over the fact that at the first instant, a stone's movement is very slow; nor does it draw courage from the sure knowledge that the stone will move faster after a while. The force of gravity simply makes the steady pull, and the speed of motion increases inevitably. The same is true of the efforts of horses and men; only they feel bound to agonize more or less over the start.

I believe that in the experience of nearly all minds there is more or less of this difficulty, inertia, resistance to action even after the thought is clear and the resolution to act has been made. I believe, too, that every man and woman who hopes for a successful life must come to recognize clearly and frankly this difficulty of making the

start. No one who, having recognized it, is unwilling to serve his apprenticeship through this preliminary period will ever carry into execution his most worthy thought and desire. Whether the question is one merely of studying a lesson or writing a paper or making a dissection in the laboratory, or of pursuing a whole course of study, the success of the actual execution depends absolutely on the quality of the action of the reason and the will during this preliminary struggle, no matter whether it is short or long.

The unhappy period of *getting under way* is the home of lost souls. There lie bleaching the bones of all the hopes and desires, and all the puny and half-developed efforts of humanity. One learns to cross this unpromising valley of preliminary effort; but a thousand never see the farther heights of success. They try a little and fail; henceforth they are pushed hither and thither by the harsh hand of circumstance.

There is no road around this valley. There must sooner or later be developed a sublime faith, that the apparently weak and fruitless first efforts are only a necessary prelude to what will surely be strong and steady action with big results. But this easy faith that ultimate success comes through preliminary effort and distress is the growth of time and practice.

One of the chief difficulties in the mind's way may be dealt with a little in detail. When we peer into the future, time is fore-shortened. All the parts of a future

experience, as we gaze upon it expectantly from the present, seem bunched together. Dreams of pleasure and profit usually leave out of consideration the long labors preliminary to their achievement, so the joy seems all undiluted. So, too, all sorts of difficulties, however well they may be understood, seem crowded close together. In our thought they are not diluted, spread far apart by time.

One of the essential conditions of success, either in study or in business or in social life is that the mind shall have a clear grasp of the difficulties to be met, a clear view of what is coming. The plans that are laid must include provision not only for all known difficulties, but for unforeseen emergencies. It is never safe to belittle a task when preparations are made for its execution. But after the task has been considered, when its nature is understood, and its difficulties fully realized and planned for, then the will needs to be focussed on the initial step alone. A large proportion of human failure is due to the fact that all the obstacles loom up immediately in front of the mind's eye. The lengthening course of time and its effect are not sufficiently thought about. It is because the moral courage is called upon to face and, as it were, to act against all the obstacles at once, and that, too, at the beginning, that makes tasks of every kind so much dreaded. Obstacles are the great sifters of men. Only those with faith that the first blow counts, though it may show no results, are willing to

give the blow and follow it with another. They know that all things must yield, if they are struck often and hard enough.

The absence of results after the first efforts dampens first enthusiasm and then hope and interest. When these are smothered, action ceases. There is never effort without faith. But even the worst failure in an effort to perform a student's task is a valuable experience. It helps to clear the ground. Failures reveal the false notions with which the mind started. Every failure, if correctly valued, brings the mind nearer to success. Only children and inexperienced enthusiasts expect first thought to ripen into successful action. The relation between thought and reality, theory and practice, is not so close as that.

It is important to remember in this connection that difficulties dissolve in the doing. No matter how weak a student's first results may be, no matter how faint the first gleam of his understanding of his task, that little is the most powerful weapon that has yet been forged for further struggle. Comprehension now has something to take hold upon. The mind can grasp the little that it has, and use it in looking for more. The power of performance is cumulative. The mind of the student may not be sensibly stronger at the end of a half hour of struggle, but its capacity for effective thinking is vastly greater, because with every effort put forth something new is gained that lends help in understanding

everything that is touched afterwards. The hands may be the same, but the tools are better.

It is at the beginning of each task, and at the beginning of the student's career, that this principle of cumulative power needs to be realized. The amount of time spent in preliminary doubt, half-heartedness and misery over lack of good progress will depend largely on faith. The time will be short or long, minutes or hours, according as one is or is not confident that the difficulty is only the friction of getting started.

The general perversity of things often serves to check an individual's action by disappointing him. Nothing seems to turn out as expected. Hope and expectation seem blasted at the outset. But while we cannot too greatly emphasize the importance of trying to foresee a result, it is well to remember that realization is usually widely different from expectation and usually falls far short. The effect of constantly disappointing expectation depends on the attitude of the mind.

The real attitude of the scientific man toward what is yet unknown is based upon an unquenchable desire to know the reality that is hidden behind the mysterious curtain. Desire for truth is the distinguishing mark of the true philosopher, no matter whether it fulfills his expectations or smashes them to atoms. Disappointment in his expectations does not check his efforts, because he is not merely seeking to fulfill those expectations and gratify his hopes. He is trying to find the truth.

If after he makes his first efforts he finds his expectations flatly contradicted by the results, the failure only serves to correct his judgment, and brings him nearer the truth. In short, the scientific man must be open-minded, in a state of expectant attention, confident that something is to be learned, with willingness and a dogged determination to find it out, and with the love of truth so strong in him that, no matter what the results may prove to be, he will accept them frankly as the real object for which he was looking.

If a general's happiness and hope of fame depended on his carrying out in every detail the plan of a campaign that he had mapped out in advance, his chance of disappointment would be great indeed. His will is obstructed at every turn by a perverse opponent. But if his ultimate aim is the capture of the enemy's men and guns and territory, his best powers are kept constantly at work to meet new conditions. And what is true of the scientific man or the soldier is true of the business man or the student. Expectations do not constitute the sum of life; often, perhaps, they do not even represent the best that may befall. To wring success out of failure is both the doom and the glory of the real man.

CHAPTER XXV.

THE PETRIFIED WILL: HABITUAL MASTERY.

The only valuable action is action that is persisted in. Nothing produces results of any value in science or study or business except following up the first results and securing the total cumulative effect of steady action. No general can win a campaign by merely winning a victory, unless he follows up the victory. A broad range of vision is of no value to the hunter who does not give steady pursuit. It is the after strokes that, outwardly at least, count for most. Contentment with the first fruits never wrought any good to either a soldier or a scholar.

Recent history has furnished the world a remarkable example of a petrified national will. The Boer farmers first startled the world by the courage with which they faced tremendous odds and by their remarkable successes. But that first feeling of excitement over the semi-miraculous gave way to chronic astonishment at the persistence with which the Boers held out against their enemies and apparently smashed all the doctrines of probability by sheer force of will.

The only reason that can be given why the Boers did not yield at certain critical and apparently hopeless

stages of the war is that they simply would not change their minds, and their enemies, who had done nearly everything else, could not change their minds for them. Stubbornness of will, even under the most distressing circumstances, has made their struggle stand out among the marvels of history. With most of their men and nearly all their women and children prisoners, with their initial resources exhausted, with but slight opportunities to replenish their necessities, their petrified will found a way in the wilderness to keep soul and body together, to evade the enemy, to puzzle the world and make a mighty people wish that they had waited for a friendly destiny to accomplish the conquest by peaceful means. The world may pity and puzzle; but it was a case of unlimited resources against a petrified national will.

It would be an easy matter to cite illustrious examples of how earth's great captains have conquered adverse conditions and scored a great though belated triumph simply because they would not yield. But we need not appeal to them. Fixity of purpose, a will that clings with teeth and claws, that calls into service every mental device and power is essential to success in the hour of study as well as in the hour of battle, to the success of the barefoot boy as well as to that of the warrior.

The desire to have hold of a bull-frog is likely to be strong in every boy that has ever heard one sing. But not every boy gets his desire. A squad of boys may throw sticks and stones and roil the water of the pond. But, while they may all be gifted with equal powers of devising

means to ends, they are not equally endowed with the tendency to cling to a purpose through failure. The desire for a bull-frog may be stronger in some than in others, but that does not determine who will stay longest at the pond. The boy who first suggested catching one may be the first to leave. They may all straggle home and leave behind the lad who at first felt the least desire for a bull-frog. He may not be impulsive or enthusiastic; his feelings are slow in growing. But his will is like a steel trap; it can shut, but it cannot open.

All the efforts of the crowd have only made his task more hopeless; because the water is disturbed and so are the feelings of the frogs. They grasped the meaning of the situation quicker than the boys, and hid. But this boy has learned some important things; he knows now how not to catch a bull-frog. He seems to have no equipment left except the desire and the will, and failure for experience. But for him there is only one desire, and he has a will that never whiffles. That combination lays under tribute the highest and best thinking of which the mind is capable.

When the sun has gone down and supper time is past; when the mud has settled to the bottom of the pond and the water is clear again; when the moon is up and the frogs are singing, that boy plods home. He is dirty, wet and hungry and has evil forebodings of what is in store. But there is a kicking bull-frog in his hand, and that is enough. He does not know what part the frog can play in appeasing the wrath to come, but he

will offer him in evidence and yield him up in sacrifice. It is not the frog alone, but the triumph that bears him up and makes him think it was worth while.

Of course, it may well be admitted that there is a limit to the exercise of a stubborn will. Will and wisdom sometimes part company, and it becomes a nice question as to when to use discretion and quit. Personally, I have seen so much failure, due to lack of stubborn purpose, and have so carefully studied the failures and triumphs of students, that I prefer the stubborn will, even though it sometimes brings disaster. I am inclined to think that no disaster this side of death is irretrievable; and such a will can use disaster to retrieve success.

Brilliant scholars are always charming in a teacher's eyes; but I think their value is mostly temporary. Brilliant scholarship is no sign of coming success unless the character that possesses it is also endowed with great executive force, with a strong and finely tempered will that never breaks. But nature does not often make this combination. While one has a fine head, some other fellow, with a somewhat duller head, may have the necessary streak of stubbornness and the *power to act.* And the latter wins—not the prizes in school, but those of practical life, and, in the end, those of sound scholarship, too. All the "self-made" men and women are endowed with powerful wills coupled with resourcefulness. They have used the usually moderate gifts of nature so effectively that they have outstripped and now outshine many brighter minds who had opportunity thrust upon them.

I had two students under observation at the same time for two years. Both had had about the same opportunities, but one was quick and the other slow. The one could learn a thing while the other was getting ready. But the genius never learned to overcome anything that he did not like. He never voluntarily removed an obstacle, but always sought to avoid it. Each year he encountered something that did not suit his taste. In things that he liked he was a master; from everything else he asked to be excused.

Slow-In-The-Head was not master of anything. He had a clear mind, but had to work for everything he got. But he made a fight out of everything that he undertook. Pugnacity seemed to be a ruling trait with him. The first few weeks of his new school life looked to others like weeks of agony. But he never asked for a truce nor for time to catch his breath. When "brighter" students complained that they were driven with work, and he was asked his opinion of the matter, he only said, with a suggestive snap of his hard-set lower jaw, "I have no kick to make."

Both entered college. The bright student went home in a few weeks, by invitation, because at college they did not drive students to things they did not like, and he would not drive himself. The other is a college man—an honor to himself and to everyone who helped him get an education. Moderate intellectual powers coupled with a dogged disposition to accomplish some-

thing, with big fighting and small dodging powers, furnish the best material for a really solid character.

A burning-glass in motion never set fire to anything. But even a lens of ice, held steady, will make a fire. There is little use to talk about training the attention, memory, and powers of observation, unless the will is trained to keep a strong and steady hold upon the movements of the intellectual life. And I believe that all men and women who are not mentally defective are capable of training their wills. A few are so strongly endowed by nature with the gift of habitual mastery that they seem to need no training. They are the born leaders. They throw all who come in contact with them at once into the subordinate attitude of helpers. But, while the world needs and uses these gifted leaders, the individual student is under obligation to learn to lead himself, to cultivate the spirit of habitual mastery, until prompt and effective action upon every subject and occasion becomes the normal individual trait.

There is an unwritten law on the farm which says that the older brother may drive the horses and that the younger brother shall jump off the wagon and open the gates and bars. Sometimes the younger brother is one of the gifted ones, and raises his head of dominion above the rest of the family. But such occasional exceptions only prove the terrible strength of the law that one shall lead and the other follow. It is a law of brute as well as of human life—this law of leadership. When once it is accepted,

disputes disappear, responsibility is concentrated, and more and better work is done.

But what about the younger boy, who is handicapped by the fate of birth? It is a small matter that he should have to forego the proud pleasure of driving the horses except when, in a spirit of benevolence, the older brother makes concessions. With the privilege of mastery goes the weight of responsibility. When there is hard work, the older brother has to do the hardest part of it. When there is perplexity or danger, he has to make the decisions, take the initiative and see that all goes well. He is the last to enter school in the fall and the first to leave it in the spring. His education, apparently, is sadly sacrificed to the interests of the family.

Nobody sees what has been done to the younger brother. When the leader leads, the others cease to think. This is not due to lack of capacity, but to lack of opportunity. Yielding the mastery to others, even though it may not breed personal weakness, makes the individual defenseless from lack of practice. This fact is not impressive until the leader is removed. Kill the leader and the herd of elk will mill; and while it is wheeling round, the whole herd can be killed by a single man before another leader is developed. This is the interval of disaster—the time when the habit of *following* works havoc and reveals the greatness of the weakness. When the older brother is withdrawn the younger one tastes the bitter-sweets of leadership without training.

The same truth holds good for nations. When the

Romans withdrew from Britain, after four hundred years of mastery, the natives had lost the art of self-help, and were at the mercy of invaders. Their appeal for help was pitiful. They had lost capacity for initiative and leadership, and the development of it seemed out of the question. Many a nation has suffered terribly in war while it was going through the intermediate agony of developing real leaders. "There is always a man for the crisis"—proof of slumbering capacity repressed by fixed conditions. But the punishment that comes to the nation while it is training its leader is a fearful price to pay.

It takes many years of harsh experience in later life for a younger brother to overcome the effect of the relation that he bore in boyhood to a competent older brother. When he goes from home the spirit of dependence and hesitation follows him till he has learned how to exercise his judgment and will effectively. He may have more of the learning gained from books, but in the serious crises of life that confront them both, it is the older brother who sets his sound, cool judgment to work and enters upon steady and vigorous action that makes things come out right, while his younger and perhaps more gifted brother is hesitating. There is a vast difference between book-learning and personal power.

The heaviest emphasis throughout this whole book has been on the necessity for cultivating clear and accurate thinking. A good memory and all the other desirable mental traits shall be added unto him that trains himself to clear and cautious thought. That is the first

requisite for an intellectual life. The second is like unto it: habitual mastery, the power and chronic habit of carrying into execution the vigorous thought in spite of obstacles and so-called impossibilities. The will is the backbone of the character. If that is a cotton string, there may be ever so much capacity for absorbing knowledge, but no use will be made of it.

There can be no hope of a well-regulated life, no assurance of habitual success, unless the will is trained to act regularly, steadily, vigorously, to act promptly and persistently upon a well-considered plan, and to brush difficulties aside as incidents subordinate to the main issue.

This training must begin by acting out one's thought, even if the action seems ever so crippled at first. The power to do increases with the doing. In the silence of the years will grow up a character that feels the constant joy of accomplishment. The moral culture that comes from such training of the will can never be taken away. The man is never the same again after a period of constant, earnest, obstinate effort. Through the vista of the years he can see the growth of personal power, of whose development he may, at the time of its growth, have been entirely unaware.

The object of all this exercise of will is to train it to act promptly and confidently, not merely in the presence of oft-repeated difficulties, where habit will come to its aid; but to act in the same way when face to face with new, unusual difficulties. If one has the necessary

confidence and willingness within him to meet a great difficulty at a single impact, all after-action becomes easy. Shall a small boy plant his feet cautiously in the edge of the river, dip up a handful of water and wet his arms, "to get used to the cold," or shall he jump from the spring-board and go in head first, leaving no time for the long-drawn-out agony of getting wet? Shall the will remove such difficulties piece-meal, and so develop *the habit of shivering* at the thought of action, or shall it, when the decision is made, brush aside the difficulties by shortening them?

I like the story of young Fred Ouillette, "pilot and son of a pilot . . . . a hero to the boys of Montreal, a figure to be stared at always by anxious passengers." Cleveland Moffett told it in St. Nicholas for April, 1901, and it has in it the secret of the making of a man, the explanation of how habitual mastery is made easy.

In Canada, the land of pilots and hardy watermen, "there are not ten—perhaps not six—men to-day, French or English or Indian, who would dare the peril" of shooting the Lachine Rapids at Montreal with a steamer-load of passengers. Fred Ouillette is one of the six. Moffett talked with him about it and tells what the pilot said.

"He emphasized this, for instance, as essential in a man who would face that fury of waters with many lives in his keeping: he must not be afraid. One would say that the rapids feel where the mastery is, whether with them or with the pilot, and woe to him if pounding heart or wavering hand betray him. The rapids will have no

mercy. And there are pilots, it appears, who know the Lachine Rapids, every foot of them, and could do Ouillette's work perfectly if Ouillette were standing near, yet would fail entirely if left alone. Every danger they can overcome but the one that lies in themselves. They cannot brave their own fear. He cited the case of a pilot's son who had worked in the Lachine Rapids for years, helping his father, and learned the river as well as a man can know it. At the old man's death, this son announced that he would take his father's place, and shoot the rapids as they always had done; yet a season passed, then a second season, and always he postponed beginning, and, with one excuse or another, took his boats through the Lachine Canal, a safe but tame short cut, not likely to draw tourists.

"'Not start heem right, that fadder,' said Ouillette. 'Now too late. Now nevair he can learn heem right.'

"'Why, how should he have started him?' I asked.

"'Same way like my fadder start me.' And then, in his jerky Canadian speech, he explained how this was.

"Ouillette went back to his own young manhood, to the years when he, too, stood by his father's side and watched him take the big boats down. What a picture he drew in his queer, rugged phrases! I could see the old pilot braced at the six-foot wheel, with three men in oilskins standing by to help him put her over, Fred one of the three. And it was 'Hip!' 'Bas!' 'Hip!' 'Bas!' ('Up!' 'Down!' 'Up!' 'Down!') until the increasing roar of the cataract drowned all words, and then it was a jerk

of shoulders or head, this way or that, while the men strained at the spokes. Never once was the wheel at rest after they entered the rapids, but spinning, spinning always, while the boat shot like a snake through black rocks and churning chasms.

"They used to take the boats—as Ouillette takes them still—at Cornwall, sixty miles up the river, and, before coming to Lachine, would shoot the swift Coteau Rapids, where many a life has gone, then the terrifying Cedar Rapids, which seem the most dangerous of all, and finally, the Split-rock Rapids, which some say *are* the most dangerous. And each year, as the season opened, Fred would ask his father to let him take the wheel some day when the river was high and the rocks well covered, and the boat lightly laden, wishing thus to try the rapids under the easiest conditions. But his father would look at him and say: 'Do you know the river, my son? Are you sure you know the river?' And Fred would answer: 'Father, I think I do.' For how could he be sure until he had stood the test?

"So it went on from year to year, and Ouillette was almost despairing of a chance to show himself worthy of his father's teaching, when, suddenly, the chance came in a way never to be forgotten. It was late in the summer, and the rapids, being low, were at their very worst, since the rocks were nearer the surface. Besides that, on this particular day they were carrying a heavy load, and the wind was southeast, blowing hard—the very wind to make trouble at the bad places. They had shot

through all the rapids but the last, and were well below the Lachine bridge when the elder Ouillette asked the boy, 'My son, do you know the river?'

"And Fred answered as usual, without any thought of what was coming next, 'Father, I think I do.'

"They were just at the danger-point now, and all the straining waters were sucking them down to the first plunge.

" 'Then take her through,' said the old man, stepping back; 'there is the wheel.'

" 'My fadder he make terreble thing for me—too much terreble thing,' said Ouillette, shaking his head at the memory.

"But he took her through somehow, half blinded by the swirl of water and the shock. At the wheel he stood, and with a touch of his father's hand now and then to help him, he brought the boat down safely. There was a kind of Spartan philosophy in the old man's action. His idea was that, could he once make his son face the worst of this business and come out unharmed, then never would the boy know fear again, for all the rest would be easier than what he had already done. . . . . Fred Ouillette has been fearless in the rapids ever since."

Courage and force of will can be made a habit as well as giving attention. Quality of action, like quality of thought, is the final test of manhood. A well-trained will, like a well-trained horse, never leaves a load where it found it. It neither hunts difficulties nor dodges them.

There is one quality of the will that has not yet

been mentioned. The universe goes on in rythmic pulses. Work and rest alternate. The mind that has learned to take a prompt and vice-like grip upon a task needs to learn to let entirely go of it at intervals. Some minds get into the state of one who has grasped the poles of a powerful electric battery. When once they take hold of a subject, they cannot let go again. Some fatal force holds them there. The child that has become so keyed up that it does not stop its play when tired, but goes on and on by sheer tension of the nerves, finally finds relief in collapse and a fit of crying. The statesman or business man who at night cannot let go of the problems that he handles by day, will pay the price with insomnia. His relief comes by collapse and prolonged, enforced, and unprofitable idleness. The student, too, who carries the thought of his work wherever he goes, who carries his text-books to a concert, who does not have regular periods of stress and relief, in whom there is no well-marked pulse of action and repose, governed by an efficient will, can never hope for the genuine pleasures that come of normal, healthy action of either mind or body.

CHAPTER XXVI.

THE FEELINGS.

We have hitherto tried to answer the question, "How train the mental powers, and how carry thought into action?" In other words, we have dealt with method, but have said practically nothing about the material of life—the kind of thoughts it is best to think and the kind of action that constitutes a successful life. Now that the development of capacity has been discussed, the book might be closed. But the principles that have been laid down are just as applicable to the making of a first-class rascal as to the development of personal worth and uprightness. I have some strong convictions about the relative value of ability and character; and the rest of the book will be devoted to a discussion of the materials of life.

Our feelings are our masters. It is not worth while here to raise the nice point as to which comes first—thought or feeling. All we need to accept now is the fact that thought and action and feeling all react on and influence one another. Feelings are produced by inward thought or outward influences, and they in turn start our thought and action. The outward life and the inward thought may be described, in a large sense, as a

continuous effort to express the feelings. The feelings, the sentiments, lie close about the roots of conduct. Schiller quaintly put feeling in the foreground of human life when he said, "While philosophers are disputing about the government of the world, Hunger and Love are performing the task." Feeling is really the fundamental fact, and intellect and will are its servants. The cultivation of the feelings is therefore at least as important as the cultivation of the other mental powers by means of which we gratify and give expression to them.

If there is to be calmness of spirit and effectiveness in the conduct of life, there must be a *standard of feeling.* The question, at least with the serious student, is, shall his feelings be a succession of momentary passions and temporary enthusiasms, like the snapping and crackling and flashing of burning leaves and twigs, followed by dull and ashy reaction? Or shall they be the deep and steady feelings that accompany deep-rooted principles of life, that never flare, but burn and smolder steadily beneath the surface, unnoticed by spectators, like the burning of the deep forest soil after the surface fire has rushed past and gone out?

It has been found necessary repeatedly in the course of this book, to emphasize the contrast between minds swayed by the immediate temporary interests of the hour or the day and minds that are steadily dominated by permanent interests. The one kind of life is an impulsive, unguided career. The other kind aims at definite, far-reaching results, and all the personal powers and all out-

ward circumstances, are forced to contribute toward the accomplishment of those definite ends. In the latter case there is likely to be a wholesale sacrifice of present temptations, pleasures, and successes, a rejection of immediate results in favor of others, more ideal and distant. Such choice of the more permanent interests of life and the sacrifice of temporary successes, usually has a profound effect on the feelings and results in a rapid development of character.

It often happens, of course, that such a choice even, may be bad. Many men bend the energies of a lifetime and spend the hard-earned competence of a whole family to satisfy the spirit of revenge. Some great wrong, committed by another, stirs into activity the fires of a vengeance that never burns low till ruin lies like a black pall over the lives of both the aggressor and the aggrieved. The feelings of pride, doubt, revenge, malevolence and all their like may be as firmly intrenched in the life and govern its whole course as completely as humility, faith, forgiveness and benevolence.

Selfishness and sympathy, meanness and justice, hate and love, do not rule a life together. One or another is likely to become permanent. In a mind governed by the nobler permanent interests there may be violent whirlpools of feeling, due to constitutional defects or extraordinary combinations of exciting circumstances, but the current of feeling recovers itself and follows a steady course. If the choice is a good one, the spirit of self-control increases with every sacrifice that is made of a

present pleasure to a future good. A great difference in quality of character between a shiftless, impulsive, inconsequent individual and one whose conduct is outlined for a lifetime is not only steadiness of purpose in the latter, but great steadiness of the feelings.

Nature will have the toll for the force that she expends. Wild enthusiasm and the fierce flaring of passion must be atoned for by despondency and pain. If the pendulum is touched it will swing both ways. Many a thoughtful mother dreads to hear immoderate laughter accompany the play of her little brood, for she knows, as well as the philosopher knows what the pendulum will do, that pain and weeping follow close on its heels. The law of action and re-action is the law that governs the feelings, too. Mild alternations of the gay and the grave are pleasurable; the extremes cause the pain.

But even the life of impulse, of feeling uncontrolled by the large and permanent hopes and beliefs of a lifetime, is better than one in which feeling is present but leads to no action at all. It is possible to let the feelings play and be worked upon until action becomes practically impossible. Chronic novel-readers often weep over fictitious woes of imaginary heroes and heroines, but have no feeling whatever stirred in them by actual want or suffering or the patient heroism of life. Feeling has so long failed to lead to action, that action is repugnant; the life goes up in the smoke of ineffectiveness. Incompetence is characteristic of this type. The victim seeks the excitements of imaginary tragedy and comedy

in order to create the feelings he desires. The *feeling* is the total reward; and the slavery is as hopeless and degrading as that of the morphine fiend who slinks into an alley or hallway to "take the shot" that re-awakens his dormant dreaming powers.

The day-dreamer, too, is the hopeless victim of feeling that finds no expression in activity. He conjures up his rosy dreams again and again for the sake of the feelings that accompany them. And when once this habit has fixed itself upon him, there is less hope for him than for the dry bones in the valley of Ezekiel's vision. Nothing but the hard, unfeeling knocks of a relentless world can re-awaken a spirit, thus enthralled, to healthier sympathy for the real things of life. One who wants to make himself intellectually effective has to see to it that his feelings are not left to the control of pure imagination but that they shall be harnessed, as a working force, with his thinking and willing powers, into a team that shall deal directly with realities.

But we need to return once more to the "impulsive life." It is not enough that the feelings shall spend themselves on real things, and lead to some sort of action. The chances always are, that action dictated by uncontrolled impulse, will do more injury than good. A parent may ruin a child by a "quick succession of kicks and kindness," each of them dictated by the spontaneous feeling of the moment; while similar treatment, distributed with reference to the real deserts of the child instead of the impulses of the parent might do real good.

The silly woman that carries flowers to a murderer's cell, and the insane mob that takes him from jail and hangs him, are very much alike. There is no balance-wheel of judgment, no steadying influence of clearly thought-out principles. Feelings hold ungoverned sway; and action follows directly upon impulse. The woman's lack of a large, correct view of life, the absence of the sense of justice to counterbalance sympathy, results in failure to pick out the one really entitled to sympathy.

The mob is no better than the man it hangs. His perverse, ungoverned feelings spurred him to do murder, and theirs do likewise. Indignation over crime is a very creditable feeling and one that well becomes a decent citizen. But reverence for law and faith in the power of the community to deal with crime are absent in the mob; there is no counter-irritant for the wild feeling of indignation and it becomes ungovernable. Sensible action can result only from a steady interplay of feelings which modify and balance each other and give judgment an opportunity to consider the merits of the case at issue. Civic responsibility is so greatly diluted in a republican commonwealth that there is not connected with it any permanent feeling powerful enough to lead the individual to steady action looking toward the improvement of judicial methods. Instead of untying the Gordian knot, he cuts it. Instead of acting under the quieter desire for peace and order he gives way to a violent, barbaric feeling which leads him to do violence as bad as that he seeks to punish.

A man may have very powerful feelings, and yet his conduct be noble and judicious. If violent feelings lead to violent action it is not alone because of the force of the feelings, but because other feelings that would easily counteract them have not been cultivated. A violent, unbroken colt can be managed in a *team*, if there is a steady, well-trained horse on the other side of the wagon-tongue. But in the absence of the steady horse there will surely be a runaway. So with the citizen. In quiet times he is indifferent to the enforcement of the law, so he does not develop a feeling of reverence for it; and that is why, when the excitement comes, he is not himself a law-abiding citizen. There is feeling enough, but it is misplaced and unbalanced.

CHAPTER XXVII.

SCIENCE CULTURE AND FEELING.

There is another phase of the subject of feeling that is of great interest to the student. He may become one of the class who devote themselves exclusively to one line of activity. The result of this concentration is usually the shrivelling of the greater number of the noble feelings that give life such pleasing variety. Monotony of interest results in monotony of feeling; and there is a tendency to one of two extremes. A single, great feeling develops in connection with the subject on which the mind is concentrated and overwhelms and unbalances the life, or all feeling dies out and the life is left cold and bloodless.

I do not believe, as many people think, that deep and constant devotion to one line of thought necessarily tramples the power of feeling into the dust. The classical example of single hearted devotion to a great subject in the past generation has been Charles Darwin. In youth he loved music, but in later life lost all taste for it. He devoted a long life filled with physical suffering to the establishment of great scientific principles; and from his experience it has been argued that science blights the noble feelings that are fed by the fine arts.

But I believe the true explanation is that the love of music died in him, not because he devoted himself to scientific subjects, but because he did not attend to music. Pleasures die with the possessions that gave them birth. If the joys of life all flow from money, they disappear with its loss. The despair which results is due to the lack of other interests, which, if they were present in the mind, might still make life well worth living.

Darwin is not the only man of science who has witnessed in himself the loss of some of the feelings that fill life with sunshine. Karl Von Baer, the father of embryology, a man of keen intellect, well-balanced powers and broad sympathies, susceptible to all the finer feelings of humanity, records of himself the same neglect of the brighter things of life and its effect on him. He went outside the walls of the town one day and found men harvesting in the fields. Then it dawned on him, that in his devotion to the infant science of embryology, he had not set foot outside the walls during the whole of spring and summer. The grain had been sown and the fields had turned first green, then golden, without his knowing or thinking about it. But he had been a country boy, and feeling for nature's beauty was not yet dead in him. He lay down and wept over what he had missed in life, and asked himself whether he was doing the best for himself. The question came to him, whether it was worth while, for his own sake or that of the world, that he should stunt his life in order to find out a few more facts about the development of animals. Would not the world

find it all out sooner or later, even if he, the great loser, did a little less, if he did not sacrifice all the beauty and pleasure of life? That day was a revelation to him. Before Von Baer had worn out his life and lost the power to be a wholesome man, he abandoned his professorship and went back into the wide, heaving, breathing, feeling world and tasted the gifts of a rugged, vital life as an expert government explorer.

Those who lose their lives in the loss of their higher sensibilities are themselves to blame. They devote their energies to a single subject and make no allowance for the rhythmic movement of work and pleasure, effort and repose, struggle and peace that normally controls the life of men and animals. Feeling must be freshened. Even the dull and hopeless laborer returns to his work in the morning with feelings different from those with which he left it the night before. His work has not changed; but it looks different to him because he has changed. He has rested and been about other things, and now it is *a little new to him again.*

Feeling gives fertility to thought and a healthy glow to conduct. But constant devotion to a single subject never did anything but blast the wholesome feelings. This stripping the actual life of all feeling is usually done unconsciously and not with malice aforethought. But time works fatal changes in us that we are entirely unaware of. Neither science, nor any other one subject, can be both work and play for a soul that does not want to shrivel. In fact, the more deeply science digs, the

more need for the light of a joyous life. Neither science nor art by itself can build a symmetrical life.

Science, for example, can write an accurate definition of a tree: "A perennial woody plant having a single, self-supporting stem or trunk, the whole being not less than twenty or twenty-five feet in height." This definition is the result of much deep thought. But in order to make the definition, the beauty and grace and strength of individual trees all had to be eliminated. Who ever had a pulse of feeling beat within him from contemplating such a definition? A half-grown boy might suffer some feeling in connection with it: perplexity at not understanding it, or disgust at the necessity of attending to such an emaciated ghost of a thing.

But he knows the difference between a shrub and a white birch tree, even if he cannot understand the definition. That birch tree was made to try the souls of boys. Every shivering leaf, every rag of fluttering, papery bark is calling him with a living voice—no need of a definition here—to climb the single difficult stem to a height of more than twenty feet. If he is a real boy he will try to climb that tree. That is life welling forth from a fountain of feeling. The pale light of science is a poor substitute for the light of human sunshine.

For the scientific man or student or business man who is under the constant temptation to concentrate his efforts closely and constantly upon one thing, the only safe course is the cultivation of numerous permanent interests that appeal to the higher sentiments. Frivolity and dis-

sipation give relief from the mental tension due to long and intense application, but they leave no pleasant aftertaste, no desirable effect upon the character. The soundest pleasures are connected with the permanent interests of life. The relaxations of culture leave the mind and body fresh. They make all things look new.

As we pass on through the thickets of experience, and growing knowledge ripens into wisdom, a silent but profound change is bound to come over all the sensibilities. What once roused anger or admiration, hope or courage, no longer does so under the more penetrating gaze of a mature intellect. It no longer gives the satisfaction that it once gave. But while time subdues the feelings, it is disastrous to have them aborted. A confidence that there is good in what has passed and more good in what is yet to come must pervade the mind of him who would ripen well in the autumn of life. A broad outlook upon life, sympathy for and insight into the work and wants of others, in other fields of activity, are essential to the retention of sound feeling as life slips through the fingers. The greater the necessity one is under to concentrate all his activity in one pursuit, the more essential it is that the sunshine and showers of right feeling should not be omitted; and they come only with the cultivation of the nobler interests of life.

It may be true that sound judgment and broad culture, while they widen the scope of the feelings, also weaken them in some respects. Some of our most generous acts can be performed only while our general no-

tions are immature. Two men walk down the same street. The first drops a nickel into every beggar's hat. He feels generous and acts promptly. Both he and the beggar have an immediate reward of pleasant feeling. But his acts have no lasting qualities, and neither do his feelings. His conduct will vary sadly even in different parts of the same day; and in time he may altogether lose his interest in the business of giving. He may suspect after a while that he has been helping rascals and turn ugly toward the begging business.

The other man drops never a nickel in any beggar's hat. He may be just as deeply anxious to help a little in life's struggle, but he loses the passing pleasure because he *knows* too much. He is guided by broad principles of charity and realizes that such giving does more harm than good. He knows that charity organizations can care for all in real distress; that some beggars get more by begging than other men do by honest labor; that in giving promiscuously he would only be helping to blight the spirit of self-help. He may give ten times as much through charity organizations as the other man gives directly; but he seems to be at a great disadvantage. Looking, as he does, farther into the future, to the ultimate effects of his acts, he destroys the spectacular element of giving. His premeditation seems to destroy feeling.

But in suppressing impulse and foregoing the little passing pleasures of self-sacrifice, he is laying the foundation of a life-long interest. As the fruit of his conduct ripens slowly, the pleasure in it, instead of being fitful,

is steady and increases as the years go by. There is abundant compensation of feeling to him who is willing to make it cluster round great interests. But it requires self-control and steadfastness of spirit. It is easier to take the present pleasure and let the future take care of itself.

A poor man in New York city faithfully does a piece of work. When he seeks to collect the bill, he is abused and defrauded of his pay. What can he do? Might makes right. The amount is too small to justify legal proceedings, and he cannot afford to employ counsel; and in the end he would be beaten by the sheer process of wearing out. What can a true citizen do to help this case? He cannot afford to take up the legal struggle; and he cannot bear to leave the man helpless. By giving him the much needed money trouble is avoided, relief is given, and the feelings of sympathy are gratified. But all these effects are temporary. The permanent effects are as follows:

One more rascal has been victorious and will regard his policy as a successful one. One more poor man has been made to feel the twinge that goes with accepting what has not been earned—the loss of pride, the sting of beggary, the conviction that there is no justice on earth for the poor. One more philanthropist has added to his experience another element of gloom, re-enforced the feeling that might makes right—and received the thanks of a crest-fallen honest man. The total permanent effect is bad—on the loser, the winner and the giver.

But there is another way, that appeals to other feelings and deals out justice as well as mercy. Jacob Riis, who has shown how a noble life may be moulded with nothing but a clear head, a sound heart and willing hands, has described that other way. It is a "law hospital" that enforces the honest claims of defrauded poor men. The philanthropist can contribute toward its *fighting* fund. The poor man gets his own, keeps his self-respect and carries away the feeling that justice is not blind to the rights of the poor; the rascal pays his debt, suffers defeat, and is made to philosophize anew on the old adage that honesty is the best policy; the philanthropist has a broader outlook, a postponed but deeper pleasure, and the feeling that he is an element in the mighty forces that are working toward the realization of justice and righteousness—the highest ideals of the race.

The principle that I have tried to bring out with illustrations drawn from the field of philanthropy holds true for all the phases of human activity. Quietness, dignity, lasting quality, can be given to the feelings only by setting up standards that will still be bearing fruit in the autumn of life. The sentiments of purity, truth, faith, benevolence, justice, are likely often to receive severe shocks, but if the individual is equipped with high ideals the sense of permanence and triumph will underlie feeling, thought and conduct.

CHAPTER XXVIII.

IDEALS.

Milton wrote to Hartlieb: "I call, therefore, a complete and generous education that which fits a man to perform justly, skillfully and magnanimously, all the offices, both public and private, of peace and war." That is a comprehensive definition of a good education. It includes everything that can give strength and nobility to the individual—permanent courage, good citizenship, good morals, willingness to serve and suffer for the good of men and of the nation. Something more will be said hereafter about the difference between ability and the purpose that is in the heart of a man; and it has been already sufficiently emphasized that conduct is profoundly affected by keeping the thought centered on the higher and permanent interests of life. Our effective ideals can be read out of the conduct of our lives. All that we do is circumstantial evidence of what we think and believe.

But ideals, to be effective, must receive something more than mere acknowledgment that they are good. The old Scotchman's version of St. Paul's doctrine is: "What I would do, I couldna', and

what I could do, I wouldna'." One can easily admit that justice, honesty, purity, truth, are good, and at the same time be unjust, dishonest, vile and false. If our ideals are to be of any value, the feelings must cluster closely round them. There must be not only assent to their value, but conviction that they are right for each particular individual, and that it is necessary to live them and uphold them. It is not so difficult a thing as it might appear, to acknowledge and believe one thing and do the opposite. Whether one shall really live up to his ideals depends on whether his feelings are under the control of those ideals.

The planting of standards of living and belief, of righteousness, purity, truth, and all the better sentiments, in the soil of the feelings is therefore a matter of deep concern. Now a fine sentiment, a noble ideal, cannot be implanted in a soul by an argument, no matter how logical. Ideals have to grow; and they grow slowly, like the woody fibre of a tree. They are, as it were, the permanent sediment of our thinking and acting; they are what is left to us after our separate experiences are over with.

There has been no end of testimony to the effect that we grow, rather than allow ourselves to be argued, into the permanent states of mind which we call our working ideals. The best Christians are those who were born and brought up in Christian homes. Their moral fibre is made out of Christian ideals. There is no serious conflict of motives, no terrible warfare of the feelings for

supremacy, because to such a mind there is almost only one possible view of life.

Those who have the best control of their mother tongue, who are most sensitive to offenses against good literary taste and to the beauties of style are the men and women who grew up in an atmosphere of culture. They use good language as naturally as they eat their food. They do not know any better (or worse) than to speak and write well. The soundest excuse for what we do and the way we do it, is that we do it the way we learned it. Habit, the burden of the first chapter in the book, still has its heavy hand upon us here. "Train up a child in the way he should go, and when he is old, he will not depart from it." In such a one there is perfect harmony among his ideals, feelings and actions; and there is likely to be less need of repentance than among those who live part of their lives under the guidance of one set of ideals and the rest of it under another set. The circle of his thought is large, his sympathies are wide, the sense of duty strong, so that he throws off temporary evil easily—gloom, passion, hatred, pride—and steadily absorbs the good. This breadth and harmony of thought and feeling are the surest pledge of spiritual success. They fix in the life the feeling that "all is well."

This all means, of course, that the best time to adopt ideals is in childhood, when we are least able to comprehend them. Such a doctrine seems like an intellectual outrage. But it is just as well to yield our consent to it, because it is the principle on which human life is con-

ducted. The acts of our childhood and youth are the most far-reaching acts of our lives. We choose our husbands and wives and our professions without the light of experience. All the most influential habits are fully developed while judgment is most immature. So, in spite of the gravity of the matter, it is hardly worth while to consider the doctrine that it is best to postpone the adoption of ideals until maturity and of professions until old age, for meanwhile we die.

It is true of all our standards, that if they are to be the sure and safe guides of conduct, they must become woven into our inmost being; they must grow into the life instead of being driven into it, like a knife or a bullet, from the outside. They must represent not merely beliefs that are acknowledged to be good, they must be modes of conduct. (Childhood, youth, and the few first years of young manhood and womanhood are the only years in which either mind or body grow.) The years will bring greater strength and riper judgment, but the face and form of the body are made for life, and so are the prospects of the spirit.

Ideals can never be two-faced. In a normal life there cannot be one set of principles to guide by day and another to guide by night, one mode of life on duty and another on vacation. Neither is there any period in life when ideals can be laid aside or thrown to the winds, with the expectation that they can be calmly resumed at pleasure. There is a widespread belief that it does no serious permanent harm for a young man to make a

fool of himself for a few years; that the chances are always good that he will recover. This easy faith in Mother Nature's patience is badly misplaced. Human fathers and mothers are often more blissfully ignorant of the real lives that their sons and daughters are leading than any other people on earth. And even when they know a little of what is going on within and without, they condone the faults and feel sure that maturity will bring the youngsters back to their senses. But Mother Nature is neither blind nor ignorant; and she neither will nor needs to condone anything. She cripples or kills the fool, because she prefers the other kind and has plenty of individuals to draw from.

She neither teaches nor practices the doctrine that youth can throw the nobler sentiments to the winds and indulge the passions for a time and that afterwards the spirit may recover itself and grow into a desirable maturity. She knows that this doctrine is as false a guide as the will-o'-the-wisp on the dank, dark marsh. She provides no moral acids that will remove the stains and the stench of misconduct.

A limb may die on a green tree, it may break off and even the knot may rot away. If the tree is young and vigorous the sore place may heal over with new wood and bark, so that nothing shows of the old defect. *But there is a rotten hole inside.* The flaw may never show again; but if the wind breaks that tree it will break at the rotten place. And anyway, the ax of the woodsman will reveal the written record when it lays the tree low.

Somewhere and somehow every violation of the normal growth will tell its gruesome tale because it has made a scar, a constitutional weakness.

To every one who succumbs in youth to physical, intellectual and moral folly, and sows wild oats, one of two things will happen in later life. After the period of unwholesome living, he either will not, or he will adopt and struggle toward the realization of pure ideals. If he does not, he may still cease all gross misconduct because it is no longer worth while. He may pass for a decent citizen and do no injury to the morals of a younger generation by example. But the music of his life is full of the minor tones of moral discord. His attitude toward moral questions, the suggestiveness of his language, all point to the slimy record left inside. Thousands of such men and women are classed as decent citizens because they are outside of jail. But they are best kept away from, when it is possible to identify them.

If after a period of folly there is a real revival or new growth of better sentiment, the case is one worthy of the most profound sympathy. The greater part of a really educated man's activity takes place inwardly. The better part of his life consists of reflection. This man never forgets. He would be willing to shed his blood for the privilege of washing out the memory of his evil deeds. The more sensitive he grows, the more he curses the day he went astray. He cannot get away from himself, and his very ideals become the judges that condemn his record. As Babbage has put it in that splendid old book,

the Ninth Bridgewater Treatise, "It is remarkable that those whom the world least accuses, accuse themselves the most, and that a foolish speech, which at the time of its utterance was unobserved as such by all who heard it, shall yet remain fixed in the memory of him who pronounced it, with a tenacity which he vainly seeks to communicate to more agreeable subjects of reflection." The terrible after-taste of evil-doing is most sickening to him in whom the character has afterwards grown purest and noblest. Reminiscence is painful in proportion as the record is stained with misconduct; and the life that has gone through folly in youth and then recovered itself is doomed to permanent secret sadness.

Youth cannot violate the laws of purity and uprightness and expect old age to make it right. Repentance does not change the record. A part of the tree of life is sacrificed. If the feelings are early fettered to ideals of peace and purity, good-will, justice, uprightness and benevolence, and there is no shock or disturbance of their mutual growth there will be a life of deep and permanent tranquility beneath the superficial turbulence of circumstances. That life will be a wholesome influence in the chaotic jostle of human struggle, full of hope and faith that truth will triumph and that all is well.

CHAPTER XXIX.

SOME ELEMENTS OF CHARACTER.

The most consummate villain furnishes just as good material for the study of psychology as the noblest saint. It is in the practical use of the mental powers that character is involved. All living nature is endowed with the fundamental desire to secure what is pleasant, but character, good character, for no other is relevant in this discussion, is built not upon what is pleasant, but upon a clear recognition of what is good, a complete acceptance of it and a life whose acts are controlled by it.

An anonymous poet has sung:

> "Sculptors of life are we, as we stand,
> With our lives uncarved before us;
> Waiting the hour when, at God's command,
> Our life dream passes o'er us.
> Let us carve it then on the yielding stone,"

The sentiment is good, but it does not give us full credit for our real condition. The sculptor, when the angel dream comes o'er him, can choose the finest marble in which to do his carving. His inspiration might burn very low if he were given no choice of materials and were told to take a block of coarse-grained granite or even

a piece of bass-wood and give expression to his beautiful vision. When it comes to shaping character, we are placed here without choice of material or tools with which to carve a seemly life. Our mental powers and capacity for feeling are fore-ordained for us. The circumstances in which we shall find our ideals and give expression to them are not of our choosing.

But we make the fatal mistake in losing courage and deciding to be nobody in particular because we think the marble of Pentelicus or Carrara is the only fit material for carving. A prisoner, when he craves to do something, can make some wonderful things with nothing but a cracker-box for material and a common nail for a tool. One who craves to know the exact structure of an animal, can make a better dissection with a toothpick and a common jack-knife than any other fellow can with an elegant set of tools.

> "The fault, dear Brutus, is not in our stars,
> But in ourselves, that we are underlings."

It is not the poor materials and tools that were given us to work with,—the mediocre mental and physical gifts —that cause the real trouble. It is lack of desire and purpose to use what we have. Marble makes a good statue, but granite makes a good keystone. And here lies the real test of solid worth. Genius may do wonderful things, but it usually fits but ill into the solid masonry of life and is poor material from which to carve a character.

It is the poor use that is made of the gifts we have that causes all the trouble. A carpenter who "measures by guess and saws by guess" cannot hold his job one day. He does more harm than good. He wastes material and only gets in the way. A carpenter's wand is his foot-rule. With it he secures symmetry, proportion, accuracy, saves his time and his material, and turns out a satisfactory job. He has a standard to go by. He uses *that same standard in all his work, everywhere and always.* A distinction is often drawn between the exact sciences and the merely descriptive sciences, much to the apparent discredit of the latter. And the distinction is based entirely on the fact that in the former,—physics, and the like,—it is possible to use exact standards of measurement to work with, while in botany, anthropology and some other sciences this has been hardly possible hitherto. Governments take the most extreme care to establish standards of weights and measures and to preserve as nearly as possible perfect models for purposes of comparison. In business and in scholarship, confidence, security, accuracy, permanent results, require fixed standards of measurement, whether that standard is a good dollar, a foot-rule, a pound weight or a foot-pound. It does not require very long or very profound thought to realize that everywhere, standards of measurement are what make it possible to do business quickly and on a large scale, what enable men to know at every step the value of what has been done and what it is necessary to do next. I do not believe, with some people, that the ability

to measure everything exactly constitutes perfect science or perfect business, but without this a high degree of civilization would be impossible.

If it is so important that there should be true standard pounds and yards in order that the pennies, in business life, shall always go into the right pocket, how can the thoughtful man or woman hope to judge the acts of others correctly or to check and guide properly his own performance, unless he has clearly thought-out standards of conduct to go by, standards that he uses always, on himself as well as others. The lack of well-established and fully accepted principles of conduct is what causes us to be at one moment on one side of an important question and the next moment on the other side. We do a thing confidently and afterwards seriously question the value or propriety of the act, or do something diametrically opposed to it because there is no constant, guiding principle. We fail to approve our own acts so often because they are fastened to no anchor chain of principle.

But neither the standards of measurement in science and business nor the standards of conduct used in the building of the individual character are determined upon and fixed by an hour's reflection and an arbitrary, off-hand decision. They are the slow and painful work of years. The carpenter's feeling toward his foot-rule, his appreciation of its value, did not arise from his merely being told that it is a unit of measurement, but from practice in the use of it. One can get along very well without a pocket-knife; the feeling that it is indispensable has

come from its constant use. So of ideals, beliefs and sentiments. They come to be established in the mind, come to flourish and to be consistently acted upon only as their worth is recognized in practice.

It is not enough, either, to expect these things to be effective in life unless the measuring rods of principle are used in silent thinking as well as in noisy action. The beauties of nature are made possible only by the silent and weariless processes that precede them. They are the audible and visible evidence that mighty work has been done in silence. There could be no rush and roar and gleam of many waters if the powers of the sun had not first silently lifted the invisible mists into the sky and the waters had not first gathered silently underground. And so it is only when the strong and silent processes of the mind meditate upon, approve, and apply the measuring rods of the moral life to the passing events that character becomes a *working force.*

Much is said about the good man and the good citizen. But the goodness of most men is negative. They do not violate the moral and statute laws of the community; they are good because they keep out of jail. But what active *force* of character does the average citizen wield? What is his real influence in the formation of public opinion, in the cultivation of powerful sentiment against wrong and in favor of right? How powerful is the sway of the average good citizen over the thoughts and feelings of his own family? He accepts sound principles readily

enough, but does not enforce them either in his own private or public life.

In an American city of twenty-five thousand people, blessed with beauty of location and splendid commercial opportunities, a city in which the "moral element" could in twenty-four hours clean out the Augean stables of political and social filth, a minister of the gospel stood up in his pulpit not long ago and told the men of his congregation, who ranked among the "best and most influential people" of the place, that so far as the public welfare was concerned, a thousand of them and their like could leave town and they would never be missed. He told them a sad truth. They were negatively good enough, but they lacked *potential*. Those same men could be excited on occasion. They might even help to hang a vile criminal; but there is no thoughtful connection between the views they hold and their private and public lives. There is no driving force of a vital sense of duty.

It is not enough for the world to know what a man *can* do; it is important to know what he *will* do. A body of water at the top of a hill has potential; if it is turned loose it will do work. At the bottom of a hill it is nothing but a mosquito pond. It is a condition of moral preparedness, of delicate hair-trigger adjustment to the calls of duty that constitutes a wholesome, effective character. It is potential manhood and womanhood that counts. What will he do under certain conditions? The whole community may be sure that a man

will be law-abiding, but the question is, will his moral character *work?* Is it aggressive?

The great confidence that some men inspire is due to the fact that their characters are positive. They leave the impression of boundless integrity. Their honesty is energetic. They are the captains of finance who are entrusted with the wealth of others; the lawyers that are given control of the vital interests of many men and women. Their integrity is not a variable quantity; they are not honest in great things and pettifoggers in smaller ones. They are *actively true* to whatever calls for their loyalty.

It may seem like a far cry from a great lawyer to a plodding student. In the former case we note the power that he wields because of his integrity. At the student's stage of life integrity brings no rewards of money and power. It would seem that it must be its own reward. But quantity of results in the end depends on quality of results at the outset. The liar and thief in school will be a liar and thief in practical life. He may condone his acts by belittling their importance, but the point of the business comes out in another place. The writer entertains the hope that he has succeeded, in this book, in emphasizing the fact that, in order to secure the most valuable results of any kind, in the intellectual life, there must *never, under any circumstances,* be any deviation from the correct *method,* when that is once recognized. And this is far more vitally true of the moral than of the purely intellectual phases of the student's life.

In nothing that the student does will he do his best unless he does it honestly. It will not serve him well nor bear the scrutiny of others until it is permeated with the moral force of boundless integrity. If he will look after its quality, the quantity will be taken care of by time. What he needs is to have the right conception and a deathless purpose to realize it in action. Ease, facility, speed, all the elements of permanent satisfaction in any line of work or conduct, all result from right conception and purpose. They can no more be retarded or shut out than the falling rain drops can be persuaded to stay in the sky when the vapors have condensed.

While we are dealing with the matter of integrity, it may as well be pointed out that the student is often exposed to conditions that are anything but uplifting. The school and college world is startled every now and then into a discussion of the evils of students' cheating; and much resonant praise is given to the "honor system," wherein every student is given free rein to cheat or be honest, as he chooses. This system relieves some people from the performance of moral duty, but does not improve matters. It is safer to trust a bull-dog with a pet kitten than to put a thief on his honor. The system gives the thief free rein to do as he pleases and puts the honest student at a disadvantage.

The honest student's attitude on this question is important. He does not accuse his neighbors of treating him like a thief because they lock their doors at night. He does not fly into a passion when he sees a policeman

on the corner. He would think his neighbor foolish for not locking his door; and is inclined to be thankful that there are policemen. Both create a comfortable atmosphere for the honest man, by making life hard for the thief. And when the school or college teacher makes provision against dishonesty he should have the energetic support of every honest student. The individual student is morally responsible for the sentiment that exists in school or college. It is a fact that "men are not made honest by legislation." Legislation is for the protection of those who *are* honest. Those who have in them the promise of honesty and uprightness are entitled to the protection of so-called moral legislation. It is the student's business to help make honesty the normal spirit of conduct.

No man or woman can be honest in some respects and dishonest in others. There sometimes seems to be such a contradictory state, but such people turn honesty into a commercial commodity. He who cheats in school, does not cheat and steal horses out of school because it would be unprofitable. He is an opportunist; he cheats when it is profitable and is honest when that is profitable. He makes merchandise of moral principles.

Uprightness of character is based on something more fundamental than particular cases of honesty. It is constant moral motive that keeps the life in perfect peace and guides conduct safely through the tangles of experience.

A young American in these days is trained to do

mostly what seemeth good in his own eyes. Independence of judgment and conduct is more characteristic of us than of any other people on earth. But that fact carries with it a terrible responsibility. The attitude of mind which the student makes habitual during his school and college days will be his attitude through life. If, with so great liberty of thought and action, there does not go a spirit of voluntary obedience to authority, of hearty acquiescence in sound moral principles and a desire to make them effective in life while in school, the mature man will find himself in a state of chronic mental rebellion against the best standards of his community, and will be an undesirable citizen. One who has so great liberty of thought and action needs to be deeply imbued with the doctrine formulated by Huxley, that we have only one clear, inviolable right, and that is the right to behave. The spirit of resistance to written or unwritten obligations while in school makes men and women who are in later life untrustworthy. It is a matter of grave importance to the development of character to learn to yield voluntarily in judgment to the decisions of superiors. In after years we learn that the judgment of our elders, based on long and wide experience, has no counterpart in the minds of the young men and women who are just beginning to try their powers on the complicated factors of life.

One may think lightly of the minor matters of the irresponsible period of school life, but unless the individual is guided in his minor as well as in his major acts

by sound principles he will surely develop the moral slovenliness characteristic of so many men and women. One may have the smallpox and still live and be healthy, but the pits remain. The photographer may tell one more lie by removing the pits from the negative of your picture, but he cannot remove them from your face. It is that dreaded moral slovenliness, disregard for truth and honor and virtue, without being actually criminal in the eyes of the statute law, that makes the opinions of so many men and women two-faced, their influence negative, their lives so soggy, so unmusical. If character is to have ringing quality it must be made of the bell-metal of sound principles, and the casting must be attended to with care, from start to finish. Any flaw will spoil the music.

CHAPTER XXX.

CONCLUSION.

Nothing has been said in this book about what a student ought to study. There has been a generation of endless discussion on this subject by the teachers, and it will doubtless continue to be talked about for a long time to come. What we are interested in now is the method and the spirit in which a student approaches and does his work.

The trouble with the masses, even of educated men and women, is that they content themselves with a mountain of memory and a pinch of reason. They accept the thought of others in prepared packages and take it into their systems without assimilating it. They are heavily weighted with well organized knowledge and noble ideals that have no real bearing or effect on their lives, because they were accepted without exhaustive thinking. That is why it is so exasperatingly true that in great crises most people throw their beliefs to the winds and act upon the powerful feelings that happen to be roused at the moment. Thoreau became acquainted with a wood-chopper in the winter snows at Walden pond, and said of him, "I occasionally observed that he was thinking for himself and expressing his own opinion, a phenomenon so rare

that I would any day walk ten miles to observe it." The danger to students, as to others, is, that they will approve of a statement of fact or principle and handle it sufficiently to remember it without forcing it into service, and making it prove its worth in practice.

Ignorance is no bar to great intellectual power; but carelessness will ruin the finest work of the greatest genius. And power alone will not yield results unless it is yoked with patience. Desire alone is a sickly companion to a student unless he cultivates alongside it the fighting qualities that make acquisition necessary and habitual.

When a piece of work is done one may feel relieved at the thought that it is over with. So much the ox is capable of. When the yoke is taken off he rubs his neck against a post, and lies down with a long snoof of relief. But any human workman that is worthy of the name will experience at least a modest thrill of satisfaction that he has accomplished something, that he has triumphed over conditions that lay before him.

But there is an attitude of mind toward work before as well as after it is done. The contemplation of any kind of task may be habitually sickening; the student may creep to his work when goaded by time and stern necessity, keeping his eyes carefully averted from its attractive features. Or the thought of coming effort may make the blood mount and the spirit rise, and the powers assert themselves. He need not, at the scent of what is coming, paw in the valley and mock at fear, like the warhorse in the book of Job, nor swallow the ground with

fierceness and rage, and smell the battle afar off. But if the thought of coming struggle does not rouse in him the best qualities of a vigorous manhood and inspire something of the feeling of joy that comes of action, there will be no pleasure in the work itself nor satisfaction in the results.

Anticipation can do its best service and give the rosy glow of real beauty to one's life only if it is kept fixed on the common affairs that are directly ahead. It is the working at one thing and letting thought and anticipation dwell on other things—the picnic things of life—that lends dull monotony to study, that makes student and workman so unreliable, so loath to begin and so ready to quit. The concentration of all the feelings upon the work in hand is what produces the moral energy that batters down difficulties. Keen attention makes the driest subject interesting. Vigorous effort is bound to produce buoyant feeling. No matter how slow-minded a student may be, if he keeps his head clear by active thinking and his powers at work by a strong will, he is bound to develop a solid and masterful personality.

Not genius, but the willingness to struggle and the undying hope of success are the qualities best suited to the development of strong manhood and womanhood. It is not in having but in getting that the pleasure of life is found. Nature's first commandment in the decalogue of success is, "Create your own environment." Accurate thinking and a powerful will are developed only in the *mill* of life. Self-command, rightly directed power,

sound judgment and right ideals are not given to heaven-born genius; they come to life in the dust and sweat of a steady struggle.

It is not so much what a man works at as the way in which he does it that is the key to inward approval and outward success. There is charm and some peace and happiness in any set of conditions *that is battled with.* Sit down and wish you were endowed with better powers and given better opportunities, and anything you touch will be "an asinine feast of sow-thistles and brambles." But no matter how heavy the handicap of circumstance, nor how dense the initial ignorance, nor how apparently weak the untrained powers may be, show a spirit of habitual mastery, and I will, in the words of Milton, "straight conduct you to a hillside, where I will point you out the right path of a virtuous and noble education; laborious, indeed, at the first ascent, but else so smooth, so green, so full of goodly prospect, and melodious sounds on every side, that the harp of Orpheus was not more charming."

It is not unusual brain power that makes the best student, but a combination of strong motive and strong will, and patient, steady action. What Huxley said of scientific men will always be true of the student. "Truth has yielded herself rather to their patience, their love, their single-heartedness, and their self-denial, than to their logical acumen."

Realization never comes true to our expectations. We look for the higher, but seem to grasp only the lower and

lesser good. By middle life we find ourselves where the fondest and wildest imaginings of our youth never carried us. But power is cumulative, whichever way we move. Action makes action easier. Nature's interest is always compound, both for reward and punishment. The dull movement of a student's routine life seems to leave no visible trace, but Time takes care of the single blows that are given, if only they are true and strong. The hour-hand of fate not only points, but moves. The silent years make clear the knowledge that was dim, and strong and accurate the powers whose existence was hardly recognized.

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